The Builder.

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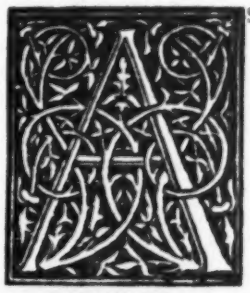
Proposed Rebuilding of the Venice Campanile.



S appeared from a letter in the *Times* last week, the Royal Academy have given their approval, and promised their aid as far as possible, to the rebuilding of the fallen Campanile at Venice on its old lines—that at least is what must be concluded from the terms in which the subject is referred to. However desirable it may be, as has been remarked, that the Royal Academy should oftener act in its corporate capacity in promoting or supporting artistic enterprises, their rather unexpected zeal in this case is hardly well-judged. We do not in the least believe that any but a very small proportion of the original worked stones can be available for re-erection of the structure, though there may be enough left to give accurate sections of mouldings and other details. The Campanile re-erected on its old lines must therefore really be a new building, pretending to be the old one, and thus adding one more to the list of architectural shams born of the idea of "restoration." It can never have the archæological and historic value of the original.

Were the Campanile a work of architectural beauty in itself, this would be of less consequence. We might then be glad to see the beauty of design restored, even though it could not pretend to be the real original building. Unfortunately this is not so. But people have got so accustomed in the present day to look upon everything ancient in architecture as necessarily beautiful merely because it is ancient, that they seem for the most part to be absolutely unable to judge of the architectural design of an ancient building from the standpoint of pure art. It is fine, because it is old; and though no one, probably, would venture to state this as an argument, even in his own mind, in so many words, it is what is for the most part practically acted on. We have indeed one remarkable example among modern writers on architecture of the maintenance of private judgment in regard to ancient buildings; an example from which the cultivated section of the public might have learned something if they had given more attention to it. That example is given by Fergusson in his great work, "The History of Architecture." We are far from holding up Fergusson as an impeccable critic. His judgments seem in some cases captious and unsympathetic; the latter quality partly the result of his hard, logical Scottish temperament. But he did, nevertheless, set up and practically maintain the important principle, that buildings of all ages were to be judged, as architecture, on their own inherent merits, independent of whatever glamour might be cast over them by centuries of historic association. Even in the case of a building which he enthusiastically admires, he points out what he considers its shortcomings, just as if he were reviewing a modern design. But this healthy example seems to have had little effect. The majority of architects and architectural amateurs still continue to bow down to all ancient buildings, and sketch them and worship them indiscriminately, as if everything that is old were necessarily, *ipso facto*, admirable.

This seems to be the case in regard to the Venice Campanile. Any one who is able to keep his judgment uninfluenced by place and association must see that the late Campanile, as we may call it, was not by any means a beautiful structure. It was a clumsy design as a whole, patched up at different times, and capped by a singularly ugly and heavy pyramidal spire. If such a design were sent as part of a modern competition design, it would certainly not receive much admiration; it would probably be severely criticised, and would unquestionably not improve its author's chances of success in the competition. The late Campanile was an important feature of Venice; it was endeared by centuries of historic association; but it was not beautiful, and it is not worth while to build what can only really be a modern imitation of it. The fact that people should desire to do so, and should be supported in their desire by such a body as the Royal Academy, only shows how dead among us the real spirit of architecture is. In any previous period of history, if an important building fell down, the immediate desire would have been, not to "restore" it, but to erect something better and finer in its place. Modern architecture is perfectly capable of producing something better—it would be in a very bad way if it were not—if it would only believe in itself and nourish ambitious aims and aspirations, instead of merely bowing down before every kind of ancient building, and sighing—"We can do nothing equal to it." We are not likely to, if we have not the spirit even to try.

The Royal Academy, in supporting the restoration, has not recognised what ought to be its proper function. It is not an Academy of restorations, but (nominally at all events) an "Academy of Arts." Practically, owing to the immense preponderance of painters in its ranks, and the greatly disproportionate space given to pictures in its exhibitions, it is rather an Academy of Painting. The President is a painter who probably knows very little of architecture, and perhaps is not particularly interested in it. The most brilliant of the Academy's presidents in recent times, Lord Leighton, really did understand architecture, and was deeply interested in it; so, we know, is one of the present Royal Academy painters. But we do not think that the Royal Academy as a body either knows or cares much about architecture, or is very well qualified to form a judgment in the present case; and at all events it has gone quite out of its right course in endeavouring to promote a restoration. Its proper business is to promote art, which is a very different thing.

What we should like to see—and what would probably have taken place in the Renaissance period of Italy—would be an architectural competition for the best design for rebuilding the Campanile, preserving as far as possible the height, bulk, and something of the general outline of the old structure, but improving the detail and proportion of parts, and crowning it with a better and more graceful spire.

FONT COVERS.

By F. C. EDEN.

DURING the last five or six years ecclesiologists have devoted a great deal of attention to the Altar and its furniture. Indeed, almost all their research has been directed to the investigation of the English Altar as it was about the year 1548. The font has suffered from corresponding neglect, and its cover is usually dismissed with a bare allusion. This is the more strange seeing that the matter is one of practical no less than antiquarian interest; for by a provincial constitution of 1236, still in force, and often acted upon so late as the seventeenth century, all fonts are required to be provided with locks and covers.

Evidence that this constitution was at one time generally obeyed is supplied by the fonts themselves. Even when the covers have disappeared, examination will almost invariably detect the marks where the staples for bar and padlock were leaded into the stonework of the rim. The bar itself is very rarely found. In 1859 it still remained in Farcet Church, Northants; and at Wickenby, Lincs., "the original fastening remains, consisting of an iron bar, one end of which is thrust through a hole in an upright wooden handle in the centre of the cover, and into a staple at the side; the other end has an eyelet or loop, which is padlocked to a similar staple on the opposite side" (Paley, *Baptismal Fonts*, p. 25).

Allusions to these irons are not infrequent in parish accounts; *e.g.*, in 1498 the churchwardens of Leverton paid "for stabelles and hoder things to ye font iijd." At Cowfold in 1481-2 sixpence was paid "pro yre pro ffante et a locke." And the inventory of the chapel at Temple Balsall in 1538 describes a "ffauntstone of tymber lyned with lede with a small berr of iron over." This wooden font is curious. I have only come across one other example, viz., that at Efenechtid in Denbighshire. There seems no reason why timber should not have been used where stone was scarce.*

It is probable that the earliest covers were mere flat lids fastened down in some such manner as that at Wickenby, and possibly the majority of covers which have been lost were simple boards† so fastened. But that some were already of considerable size and elaboration before the first quarter of the fourteenth century came to an end, we gather from an entry in the Exeter Fabric Rolls, under the year 1323-4. "For a cord for the baptismal font 3d.": a cord, that is to say, for the suspension of the cover; showing that the latter was even then, too heavy to be conveniently raised without mechanical contrivance. In the fifteenth and sixteenth centuries such an entry is common enough, and in 1466 the wardens of St. Michael's, Cornhill, bought no less than "xiiij fadom corde" for the purpose.

But not all of the heavier covers were suspended, and great variety of design and contrivance is found, as the following rough classification of English font covers will show:—

I.—*Fixed.*

(*a*) Erections of a monumental character, of the nature of a canopy or baldacchino, and forming quasi-baptisteries. There is one of stone at Luton, of the fourteenth century; others of wood, at Trunch, of the fifteenth; of the sixteenth century in St. Peter Mancroft; and of the seventeenth, in the Cathedral Church of Durham.*

(*b*) "Buffet covers," as they have been called. These are usually fixed to the rim of the font, and provided with shutters to open triptych-wise. They are fairly numerous. Gothic examples are at Bramford and Hepworth, in Suffolk. Marden, Walpole St. Peter, and Burgh possess covers of later date.

(*c*) Cases that enclose the entire font from the floor upwards. They are provided with doors for access to the bowl in the same way as the "buffet covers." Littlebury and Thaxted possess Gothic cases; and at Swymbridge is a fine late example.

(*d*) Covers fixed to the roof, or to a beam, or crane, at their upper extremity, the lower stage being so arranged that it can be pushed up to slide over the upper, telescope fashion. It is kept in position by a counterpoise in the interior of the upper part, like a modern window sash. At Ufford, Sudbury (St. Gregory), and Castle Acre are magnificent specimens of this class of cover. That at North Walsham has lost its lower stage. At Sheringham the beam only remains.

(*e*) A canopy of wood suspended a few feet above the font. One exists at Tuxford, dated 1673.

(*f*) Testers or canopies with panelled backs, after the manner of a pulpit sounding-board. These are of late date, and are used in conjunction with counterpoised covers, as at Swymbridge and Pilton (Devon) and Astbury (Cheshire).

(*g*) In some late examples the bowl of the font is provided with a lid which opens in two leaves (as in St. George's, Tombland, Norwich), or slides out (as at Saham Toney), beneath a dome-like canopy carried by four short columns fixed to a frame on the rim of the font.

II.—*Movable.*

(*a*) To lift off by hand: a large class to which the majority of late covers belongs. The prevailing Gothic type is a short spire or ogee dome, often crocketed, on a flat board. The later type is as follows:—An octagonal lid, moulded on the edge, bears eight radiating trusses, rising from the angles and meeting at the head of a central baluster-shaped post, just below the finial: the whole roughly suggesting a crown.

(*b*) Counterpoised. — These are hung either from roof, beam, or crane, and vary greatly in size, some being almost as large as the larger fixed covers, and others being light enough to lift off by hand. The balance weight takes a variety of forms, *e.g.*, a rose at Ewelme, a cherub at Frindsbury, a vase of iron painted at Skirbeck. Often it is a simple annular weight of lead through which the suspending rope runs; or it resembles an ordinary clock-weight at St. Andrew's, Newcastle, or a simple stone is used, as at Takeley. Sometimes the counterpoise is out of sight above the tower ceiling, or is concealed in the supporting framework of crane or tester, as at Astbury and Pilton.

(*c*) To wind off with a winch. The most interesting example of this method is at Sall, where a very tall cover is suspended at the end of a wooden crane that projects some 10 ft. from the front of the ringers' soller.

The material of all these covers is oak. The metal covers so much in vogue in the Low countries were unknown in England. The only undoubted example to the contrary which I have been able to find is at St. Werburgh's, Derby. It is of late date, 1711, but of good design and workmanship, with a brass pelican for a finial. The latter has now been converted into a book-rest for the lectern, and the beautifully wrought iron framework into a stove ornament! There is a tradition that the lost cover at Borden, in Kent, was of iron. There was formerly one of stone at Cockley Cley, Norfolk. The finial of old covers is often an interesting feature. Sometimes it is a pelican, as above and at North Walsham; the B.V.M., as at Freiston; or some other saint. Often, as in several late examples at York and elsewhere, it is, appropriately, the Holy Dove. Ewelme has an angel. I know of no mediæval example in which the cross occurs in this position except as a clumsy modern restoration, nor have I found St. John Baptist.

The eastern counties are the richest in font covers, both as to quality and quantity. Out of about 200 ancient examples of which I have collected *data*, seventy belong to Norfolk, Suffolk, and Essex; and this is probably not more than half the total number there existing. Other counties, Shropshire, for instance, have none, so far as I have been able to ascertain. Great numbers were lost or destroyed during the last century. An interesting late specimen at Little Walsingham was destroyed in 1861 at a restoration under G. E. Street. Some have been made up into pulpits, lecterns, vestry cupboards, &c.; others may be found lying in odd corners as useless lumber, while the fonts they were destined to protect become convenient receptacles for dust, dusters, and decorations—*quæ honestius est tacere quam dicere*, as Lyndwode says of other malpractices connected with fonts, to guard against which was the original use of the locked cover.

In addition to those already alluded to, fine covers are found at Hepworth, Worlingworth, and Bramford (Suffolk); at Burgh and Frieston (Lincolnshire); at Merton, Terrington, St. Clements, Walpole St. Peters, and Worstead (Norfolk); at Takeley (Essex); and the Cathedral and St. Andrew's Churches, Newcastle-on-Tyne.

The following extracts from Churchwardens' accounts have been selected as covering the period of 350 years during which the best joiners' work was done in England, and all the more interesting covers were made. Locks and ropes are the items of most frequent occurrence.

HEDON.

1372-3. Item pro factura unius cooperture pro fonte in ecclesia .. .. ijs.
Pro clavis pro eadem coopertura .. .. .. ijd.

ST. MICHAEL'S, CORNHILL.

1466. Itm payde for tymber and

* Archbishop Edmund's constitution (alluded to above) requires the fon to be *lapideum vel aliud*, on which Lyndwode's glos is that it must be *durabilis, et fortis, ac aquæ infusæ retentiva*, a requirement which oak lined with lead seems to fulfil. A Scottish provincial council enacts that the font is to be *lapideum vel ligneum*; but the Canons of 1603 require a "font of stone in every church" where baptism is administered.

† But even these were sometimes decorated in colour, as at St. Michael's, Cornhill.

* For illustrations of this and of a good many other font-covers, see the lithograph plates in the present issue.

workmanship of the font lydde .. .. .. ijs. ijd.
Itm for ij polyes and ij ropes for the same .. .. iiijd.
Itm for peyntyng of the font lydde.. .. .. .. ijs.

ROTHERFIELD, SUSSEX.

1532-3. Item receyved of diverse persons to the tabernacle of the fonte .. .. .. iij li.

This cover is still in existence, though "restored and beautified," as an inscription testifies, in 1816. The whole amount expended on this cover was 3*l.* 10s. 6d. The word "tabernacle" may be contrasted with the simple "lydde" of the preceding extract, and suggests (as, indeed, the cost proves it to have been) a much more elaborate affair.

LEVERTON.

1535. To Karver of boston whan he cam to se ye fonte .. .. iiijd.
To ye same for makyng a covering to the fonte .. Vs.

STRATTON, CORNWALL.

1558. Payd for a loke to the vonte. vjd.

ST. MARTIN'S, LEICESTER.

1570-1. Payd unto Wylyam Symsone and Robert Craftes for takyng downe ye thynge over the funt.. .. .. xijd.

WIGTOFT.

1599. Itm. paid to Wyllm Bown for a lyne to ye fontt .. .. vijd.
Itm. to thoms ye Wryght for a pulle and for dryvyng of ym .. .. ijd.

ALL SAINTS, DERBY.

1620. Item paide to William Wadsworth for 2 paire of bonds, a hasp, and a staple, a lock, a hooke, a pin to hang the pullis on, another at the top of the cover, and 2 staples, all these are about the font 5s. 8d.
Paid to Jno. Borne for a cord for to hang the cover in of extraordinary hemp and waxed.. .. .. .. 5s.
1623. Item for mending the font and for a locke for the same 7d.
(This lock was provided to comply with an Injunction of Bishop Morton, of Coventry).

STOCKTON, NORFOLK.

1631. It. for coullering for the fonte 1s. od.
It. for the cover of the fonte 13. iiij.
It. for the painting of the fonte .. .. .. 4s. od.

(So at St. Mary's, Reading, 11s. od. was paid for painting both *font and cover* in 1636.)

ALL SAINTS, DERBY.

1663. Item for putting to the font rope.. .. .. .. 10d.
1717. A rope for the font .. .. 1s. od.

ST. MARY-LE-TOWER, IPSWICH.

1719-20. Paid Mr. Hardy for a new cover for the font .. .. 18s.

THE HOUSING OF THE WORKING CLASSES.

AT the beginning of the present Session of Parliament, a Joint Committee of the two Houses of Parliament was appointed to consider [the Standing Orders relating to houses occupied by persons of the labouring classes, and the clauses relating to them in Local Bills and Provisional Order Bills. The Report of this Committee was published before the adjournment of the Session, and, more recently, the model clauses which are a sequel to the actual Report.

The main suggestions of the Committee can be very shortly summarised. They suggest, in the first place, that the model clauses shall be embodied in a general Act of Parliament, and they also recommend that, in settling schemes for providing new houses in place of those demolished, the Central Authority should have a full discretion.

The next suggestion is one which will commend itself to most people's common sense—namely, that new houses should not be too ambitious in character and design. This recommendation would have been a good deal more valuable if we had been able to obtain some kind of definition of the words "character" and "design." It is obvious that what one person will think sufficiently good for a labouring man another will consider inadequate; and we should deprecate anything like jerry-building or skimping of size of rooms, since there is nothing so important as that the labouring classes should be adequately housed. The importance of the Report, therefore, really lies in its sequel—namely, in the clauses which, it is suggested, shall be placed in an Act of Parliament. These are divided into two main sections: a clause for London and a clause for places outside the Metropolis.

It would, we think, have been more workmanlike if the clauses had been sub-divided into separate classes, and not into sub-sections; but it may be taken that these recommendations are subject to the amendments of the Government draughtsman, and it is scarcely likely that they will become law without considerable discussion in the House of Commons itself.

Taking first the clause relating to London, the first portions relate to the necessity of new buildings at all; but when we get to Sub-Section 5, we arrive at a point where schemes are regarded as necessary. The two main provisions are contained in Sub-Sections 5 and 10, the first-named of which runs as follows:—

"5. With respect to schemes under this section—(*a*) the time within which a scheme is to be carried out shall be fixed therein; (*b*) the Secretary of State may direct provisions to be inserted in any scheme requiring the new dwellings to be completed fit for occupation before the persons in respect of whom the scheme is made are displaced, and prescribing the rents to be charged: and (*c*) the Secretary of State may, if he thinks fit, attach to his approval of any scheme any conditions not being conditions in excess of the conditions imposed by the London Building Act, 1894, or any other Act or Acts, by-law or by-laws, relating to buildings in the County of London, and also may require the company to give security for the carrying the scheme into effect."

The clause relating to places outside is much more lengthy and elaborate than that which refers to the Metropolis, and has evidently required more consideration, owing to diversity of interests and localities. In the first place, the approval of the Local Government Board to a scheme for new dwellings must be obtained, and, before giving their approval, the Local Government Board may take into account the number of persons of the labouring classes who, at any time during five years preceding, resided in the houses or in houses already demolished, and were displaced in view of the acquisition of land by the company.

In approving any scheme the Local Government Board also is to consider to what extent, if at all, the company has given financial assistance to any schemes or arrangements of any Local Authority for the provision of labouring class dwellings This, one would have thought, came within the question whether provision was required or not, since it is obviously intended to meet the case of a considerable transference of the labouring classes within a locality before a company begins to carry out its operations.

The Local Government Board is also by Section 9 to hold any inquiries which may be necessary in relation to the purposes of the Act—in other words, a company which is displacing a number of artisans will have to carry out its operations under the eye of the Central Authority; indeed, the object of the new sections appears to be to give a larger control over promoters of undertakings in urban districts. The amendment of the Standing Orders is in this direction also, since on every Provisional Order Confirmation Bill in which power is given to take land compulsorily or by agreement, or to appropriate land elsewhere than in London, a number of clauses are to be inserted which will have the effect of limiting the freedom of promoters. For example, clauses will be inserted authorising the Secretary of State

"(*c*) In determining the number of persons for whom new dwellings are to be provided, to take into account the number of persons of the labouring class who within the five years preceding have been displaced in view of each acquisition of the land by the promoters.

(*d*) Authorising the Secretary of State, if he thinks fit, to prescribe the rents to be charged to the tenants of the new dwellings."

We hear a great deal at the present time of the difficulties of railway companies, but these new clauses will increase their public burdens. At the same time it is quite obvious, from what has occurred in regard to railway Bills during the present Session, that the House of Commons is determined that where promoters, whether railway companies or not, take land in populous districts, they shall provide adequate accommodation for the artisans who are displaced, within a reasonable time.

NOTES.

A President McKinley Memorial.

THE McKinley Memorial Committee, 320, South Broad-street, Philadelphia, Pa., U.S.A., invite designs from sculptors, without restriction as to citizenship or nationality, for a memorial to the late President, which shall include a portrait statue of President McKinley, with a suitable architectural setting. The site selected is the point of ground in line with the centre of the window of the eastern pavilion of Memorial Hall, Fairmount Park (presumably at Philadelphia), immediately opposite the eastern avenue of the Welsh Memorial, facing the roadway which extends from the Smith Memorial Gateway, westward; but the General Committee reserves to itself the right to change the location, should such action be found necessary. The designs, which are to be deposited with the secretary between February 2 and March 2, 1903, are to be in the form of sketch-models, in plaster, at a uniform scale of 1½ in. to the foot, and a typewritten description of the design and material is to accom-

pany the sketch-model: a competitor may submit more than one sketch-model. The cost of the memorial, placed in position and complete, shall not exceed the sum of 30,000 dols., and this sum is to include the erection of a full-sized model in staff at the site indicated. All expenses of delivery of sketch-models must be prepaid by the competitor, and upon request by competitors models will be returned to them "collect." Those belonging to competitors outside of Philadelphia will be placed in the care of a responsible packer. The five designs that receive the prizes by the decision of the Jury of Award shall be publicly exhibited at the discretion of the General Committee, but the sketch-models submitted and not receiving prizes will not be exhibited or published until after the award of the Jury is made public, and then only with the consent of their authors. The Jury of Award, no member of which is to be a competitor, has already been appointed, as follows:—Wilson Eyre, Jr., and Theophilus P. Chandler, appointed by the Pennsylvania Academy of the Fine Arts; Edward H. Coates and Charles E. Dana, appointed by the Committee on Works of Art, Fairmount Park Art Association; J. Q. A. Ward and Paul Bartlett, appointed by the National Sculpture Society; and Frank Miles Day, appointed by the Philadelphia Chapter of the American Institute of Architects. The Jury will examine the designs submitted, and shall report on the same in writing to the General Committee, within sixty days after March 2, 1903, as follows:—

"1. Selecting the five designs to receive prizes of five hundred dollars (500 dols.) each, provided that no prize shall be awarded for a design which, in the opinion of the Jury of Award, cannot be executed for a sum not exceeding thirty thousand dollars (30,000 dols.). More than one prize shall not be awarded to any one competitor. The decision of the Jury of Award regarding these prizes shall be final. Five hundred dollars (500 dols.) shall be paid out of the fund of the General Committee, McKinley Memorial, to the author of each selected design immediately upon receipt of the report of the Jury of Award.

2. Selecting from the authors of these five designs the one to be recommended to the General Committee for the commission for the entire work, provided the said Jury of Award decides that any one of these designs is deemed worthy of such recommendation."

Lightning Conductors.

In an interesting letter to the *Times* Mr. Killingworth Hedges points out the danger arising to many of our public buildings owing to their insufficient protection from lightning. The British Museum, for example, is only protected from lightning by means of a few isolated conductors, and when it was struck a few years ago the lightning ignored these altogether and preferred to travel by a rain-water pipe to earth, luckily doing no damage. Mr. Hedges emphasises the danger arising from the presence of the electric-lighting mains at the Museum, which form an easy path to earth for any lightning stroke, and make the fire risk a very real one. He instances the Victoria and Albert Museum, South Kensington, the National Gallery, and the Tate Gallery as cases where the lightning conductors are insufficient to afford the protection demanded by the national importance of the buildings. The apathy shown by public bodies, and even by experts, with regard to the protection of public buildings in this country is extraordinary, seeing the great attention paid to this matter abroad. The Cavendish Laboratory, Cambridge, which one would have expected to be efficiently protected, seeing that on its staff are several electricians of world-wide reputation, was recently struck by lightning and narrowly escaped being burned down. The lightning side-flashed on its way to earth from a copper conductor to a gas-pipe, and it was only the happy chance of the gas being turned off at the metre that prevented a fire. We agree with Mr. Hedges in thinking that the Office of Works might do a little more to protect our public buildings. Considerable advances have been made in our methods of protection from lightning, and systems which might have escaped criticism twenty years ago would now be condemned by experts as insufficient. As the cost of the upkeep of a good modern system of lightning conductors for a public building need only be 1 per cent. of the sum spent annually in structural repairs, it will be seen that the policy of the Office of Works is a very short-sighted one.

Lightning Conductors.

Perhaps the infrequency of disastrous fires caused by lightning stroke may account for the apathy displayed by the Office of Works and the general public with regard to the question of protection against lightning. Even when conductors are adopted, it not infrequently happens that they are inadequate for the intended purpose, and so are responsible for a false feeling of security. This appears to have been the case at Swanscombe, where the ancient parish church was recently the scene of a devastating fire. This ancient and interesting building was certainly fitted with a lightning conductor, and it was recently stated by the rector that this supposed safeguard was examined a few days before the disaster, and that it appeared to be free from any defect. As a matter of fact, the lightning stroke was diverted into the building, and in a few minutes the whole structure was blazing furiously. We now learn that the conductor at Swanscombe Church was merely an old iron pipe passing into the foundations of the tower, without any earth-plate. Since its erection some thirty years ago this so-called protection had never been tested, and the examination mentioned by the rector appears to have been nothing more searching than a passing glance bestowed by churchwardens who were concerned with a damaged rain-water pipe. The iron pipe passing for a lightning conductor was broken through 1 ft. above the ground, so that a gap of 1 in. existed between the two parts. Under the circumstances the resistance would be very great, and the diversion of current to ironwork in the tower is not at all a matter for surprise.

The Baker-street and Waterloo Tube.

Satisfactory progress has been made since the recommencement of operations upon the new subway that is to connect Waterloo Station and Baker-street. At the present time only about one and a half miles of single tunnel remain to be constructed, so that three-fourths of the subway between the points named are now finished. Lift shafts are already completed at Waterloo, Piccadilly-circus, and Baker-street, and a similar shaft at Oxford-circus is now started. Staircase shafts at Waterloo and Oxford-circus are sunk, and the booking-hall at Waterloo is covered in, ready for internal fittings. Land for all the station sites is in the possession of the company, with the sole exception of that in Trafalgar-square, and as financial difficulties are now removed there is reason for hoping that the works will be pushed to a speedy conclusion. Current for operating the line is to be furnished by the Metropolitan District Electrical Traction Company, at a price to be agreed upon or settled by arbitration. The new line will be of the greatest value to the numerous passengers who are now compelled to find their way from Waterloo to the Western district by circuitous routes in slowly-moving vehicles.

The Mishap at Chatham Dockyard.

Work upon the new dry dock at Chatham is temporarily stopped by the failure which occurred a few days ago. The first indication of something being wrong was afforded by the presence of water, which rapidly increased in depth. As the dam constructed by the contractors appeared to be perfectly sound, bags filled with clay were placed against the wall of the adjoining repairing basin so as to form a barrier against the steady inflow. In spite of this, water continued to rise, and the conclusion was arrived at by the officials that a "blow" had taken place beneath the wall of the repairing basin. Subsequent examination by divers proved the accuracy of the assumption, and it was discovered that the foundation had become honeycombed, so that it was unable to resist the pressure of water held up. Fortunately, the tide happened to be rising at the time, otherwise leakage into the dock would have resulted in the partial emptying of the basin, and serious risk to several warships lying there. As it was, the damage was sufficiently alarming, for the adjacent roadway subsided for a distance of about 50 ft., a trolley railway was carried away, and some water mains were burst. The new dock was flooded to a depth of 30 ft., causing the submersion of locomotives, cranes, and other plant; the dock railway was lifted, and the rails, attached to sleepers, floated on the surface. Energetic measures were at once taken to cope with the difficulty and to prevent further damage; but the work of construction cannot be resumed for some weeks. The incident is a striking illustration of the sleepless energy stored up in water, which is always ready to take advantage of any opening for mischief. Sometimes it finds a chance of pouring in and swamping the work of months (as in the present case), and at others it finds a way of escape from some stratum of the subsoil and so endangers the stability of buildings that have stood in safety for centuries. No engineering or architectural works require more watchful care than those in connexion with which the latent potentiality of water may be aroused.

Cables of the New East River Bridge.

For the support of the massive roadway of the New East River Bridge, New York, four remarkable cables have recently been completed and hung in position. Each cable is 18 in. in diameter, nearly 3,000 ft. long from anchorage to anchorage, and the combined weight of the four cables is not less than 5,000 tons. The actual dead load to be carried is 8,000 tons, and the live load is estimated at 4,500 tons. Each of the cables

consists of 10,397 steel wires and has a breaking strength of 25,000 tons. According to the specification, a resistance of 200,000 lbs. per square inch was demanded, and it is satisfactory to note that upon being tested the cables were shown to have an average breaking strength of 225,000 lbs. per square inch. An excellent system of protection against weather seems to have been adopted, for the wire was thoroughly coated at the mills with a thick mixture of graphite and oil, and the completed cables are to be covered with protecting shields, consisting of half-round sheets of steel, one to be placed above and the other below the cable, while in the annular space so formed a mixture of graphite and oil will be poured in hot. These are the largest suspension cables hitherto made, and the tensile strength of the material is probably higher than any previously employed in bridge building.

Gas or Steam Plant.

IN his recent report to the Town Council of Dumfries, Professor Capper considers at some length the comparative advantages of producer gas and steam for the development of motive power in connexion with electric generating plant of moderate size. As our readers are aware, the introduction of the Mond gas producer makes it possible for coal to be gasified at comparatively low temperature, and the sale of ammonia occurring as a by-product effects a large reduction of the cost. Professor Capper is therefore clearly justified in stating, when discussing the application of gas-engines, that "the Mond process stands out conspicuously as one which is likely to overbalance, under suitable conditions, the universally admitted practical difficulties in applying such engines to rapidly and widely fluctuating loads." Unfortunately, when the plant is of less capacity than 1,000 horse-power, it is not economically] practicable to attempt recovery of the ammonia, and when of smaller size than about 500 horse-power, there is a difficulty in obtaining gas of uniform quality with widely varying loads. Moreover, the liability of a gas-engine to stop if a load exceeding the normal load be suddenly thrown upon it, is a distinct disadvantage, and, as the report says, the characteristic involves the employment of much larger engines than are required for normal average working. This adds unnecessarily to capital and working expenditure, resulting also in low efficiency with accompanying irregularity of speed. The conclusion arrived at is that the undoubted thermal efficiency of the gas-engine can only effectively be taken advantage of in the case of large plants working on a load not liable to great fluctuation. The further objection to gas-engines, in the case mentioned, is found in the comparatively low speed attained when such motors are of moderate size, thereby necessitating the use of unnecessarily large and costly generators, or of more or less complicated gearing. Professor Capper expresses the opinion that there is no probability of gas plant being introduced within a reasonable time likely to meet the present requirements of Dumfries, and which for practical working will equal or in economy so surpass a steam plant as to warrant its experimental use. Of course, the report does not apply to the many cases where small gas-engines are found to be extremely suitable, but for power stations of moderate capacity, it must be taken that a steam plant is more reliable and economical in every way.

Little Wild-street Chapel, St. Giles-in-the-Fields.

OFFICIAL notice is given by the London County Council of their intention to take the burial-ground attached to the present mission chapel on the south side of Little Wild-street, near Lincoln's Inn-fields, for purposes of their new street from High Holborn to the Strand. The removal of human remains to the cemetery of the Necropolis Cemetery Co. at Woking will be effected in the course of October next. The chapel itself, which will shortly give way to the local improvements, is closed, and the services will be held in the Olympic Theatre pending the erection of a new chapel, for which a subsidy of some 7,000*l.* has been granted, together with a site in the triangle to be laid out in the adjacent Wild-street. The chapel, originally established more than two hundred years ago, can boast of a very interesting history. Of late years it has been closely associated with the labours of Sir Robert Anderson and Mr. William Wheatley in the reclamation of criminals, and since 1873 has formed the head-quarters of the St. Giles's Christian Mission to Discharged Prisoners, founded and conducted by Mr. George Hutton. The present building, erected soon after George III.'s accession to the throne, possesses a striking interior, and is well worthy of a visit. In the course of some alterations made in 1874, the vaults beneath containing, it is said, 500 coffins, were bricked up and cemented over on either side of the middle passage. In former days, and when the local surroundings bore a very different aspect, people of means and quality mainly constituted the congregation. The earlier pastors included Dr. Joseph Stennett, Dr. Andrew Gifford, the learned numismatist and librarian of the British Museum, whose collection of coins was purchased by George II., and Dr. Samuel Stennett, who there preached the funeral sermon of John Howard, the prison reformer, a member of the congregation. Gifford left the chapel in 1735, and, together with those who followed him, founded the chapel in Eagle-street, afterwards Kingsgate-street chapel, which also was lately demolished for the improvements on the east side of Southampton-row. Mr. Arthur Keen's designs for the rebuilding of that chapel were recently published in our columns. Adjoining the chapel in Little Wild-street, on its west side, is a curious block of old houses, built of red brick, and having a tiled roof and wooden front-railings, which should not be passed unnoticed.

The Glasgow School of Art.

THE autumn term of this school (situate in Renfrew-street), the head-master of which is Mr. Francis H. Newbery, is from September 8 to October 25. The school has been recognised by the Scotch Education Department as the central institution in the district for higher education in art; and judging from the prospectus before us it is carrying on an excellent work. The architectural tuition of the school aims at (1) the preparation of students for an architectural career; (2) supplementing the office training of the pupil and assistant; (3) imparting an appreciation and knowledge of architectural form to painters, sculptors, and workers in the decorative arts. Exclusive of preparatory studies, the course extends over four years. The instruction given meets the requirements of the examinations for the membership of the Royal Institute of British Architects; but in addition to the subjects included in that scheme, the School course provides also for the study of Nature and from life. Architect students learn the elements of construction, the nature of materials and the mechanics of architecture, draw from the cast, study the historical development of architecture in Europe, acquire a knowledge of the principles and growth of ornament, measure and sketch buildings and receive instruction in architectural design. Concurrently with this, they study drawing and modelling from the antique and life, and attend the lectures on ornamental design, anatomy and proportion, and figure composition. The Director of this section is Mr. Alex. M'Gibbon, A.R.I.B.A., assisted by Mr. W. R. Watson, and others. Fourteen special lectures will be given this session, commencing with the winter term. They will be delivered fortnightly. Six on Byzantine architecture, by Mr. M'Gibbon, four on sculpture, and four on subjects to be afterwards announced. The lectures are open to the public. An exhibition of the work of the students of the School will be held in the Royal Glasgow Institute of the Fine Arts, from November 4 to 17, 1902.

Failure of a Cast-iron Bridge.

PART of the cast-iron bridge across the Severn at Ironbridge, Shropshire, was disabled this week, owing to the sudden breaking of the girders. The structure possesses some interest, as it was the first iron bridge of large dimensions to be built in this country, being cast and erected in the years 1777-9 by the Coalbrookdale Company, whose works are in the immediate vicinity. The span of the arch is 100 ft., the width, exclusive of parapets, 26 ft., and the height from base line to centre 40 ft., while the weight of iron in the bridge is about 380 tons. No details are at present available as to the cause of fracture, but it is not improbable that "fatigue" due to long-continued vibration may have some connexion with the collapse. Among other powers conferred on the trustees by the Act authorising the construction of the bridge is included the right to levy toll on all vehicles, including mail coaches, and on all persons, including his Majesty's forces and all members of the Royal Family.

THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

THE town of Brecon, the administrative, ecclesiastical, and commercial capital of the county of the same name, was the rendezvous of the members of this Association for its annual excursions and meetings during the week ending the 23rd instant. Lord Glanusk, the Lord Lieutenant of the County, accompanied the members in all their journeyings, and presided at the evening meetings.

The history of Brecknockshire has, like the history of every other portion of our island, been largely determined by its physical characteristics. It is essentially a district of hills and valleys, the hills at their best rising to heights and extending to chains that must have given pause to every succeeding invader from the west; the valleys filled with innumerable streams which, in earlier days, must have rendered the progress of such invaders painful, dangerous, and slow. Yet the county is one

of such exquisite beauty that, apart from the love of adventure, greed and combat—the three ruling motives of the Middle Ages—it must always have exercised a fascination over those whom the westward course of their fortunes brought to its confines. Its administrative organisation—that is, its formation into a county—is almost the last chapter in its history. The "county" of Brecon rose almost at the same moment as its monastic establishments fell. Previously it had been in that somewhat vague and indeterminate area called the Marches of Wales. Still earlier it had been the district of Brycheiniog, the patria of Brychan, though it must not be inferred that the modern county was coterminous with Brycheiniog, or with the still earlier Garthmadrin. Tradition has it that the latter name, for which there is no authority of early script or stone, existed during the period of paganism. With the advent of Brychan at the close of the fifth or commencement of the sixth century, whose cross and whose father's grave are the glories of Llanspyddid church (two miles south-west of Brecon) the entire region became Christianised, and took on a new name—Brycheiniog, the district of Brychan. Brychan, through the medium of a half a hundred sons and daughters, almost all of whom became saints, and are known to the Triads as the first of the "Three Holy Families of Britain," had a good deal to do with the evangelisation of other parts of Wales. The scientific method has already damaged much of the story of Brychan and his children, but as it appears almost full-blown in one of the earliest and most valuable of Welsh manuscripts (British Museum: Cottonian, Vespasian, A. XIV.; *see* "A Catalogue of the Manuscripts relating to Wales in the British Museum," by Mr. Edward Owen), there are difficulties in the way of relegating it to the category of monkish fables. The witness of Giraldus Cambrensis, who lived for some years within a mile of the town of Brecon, should also not be forgotten. He says:—"Erat autem antiquitus regionis illius, quæ Brecheniauc dicitur, dominator vir potens et nobilis, cui nomen Brechanus [*al.* Brachanus] a quo et terra Brecheniauc denominata. De quo mihi notabile videtur, quod ipsum viginti quatuor habuisse filias historiæ Britannicæ testantur, omnes a pueritia divinis deditas obsequiis, et in sanctitatis assumptæ proposito vitam feliciter terminasse. Extant autem basilicæ adhuc per Kambrian multæ, earum nominibus illustratæ." Brecknockshire, of course, believes implicitly in Brychan, and accepts with almost equal credulity the most exaggerated number of his family; but the English visitor, while he may be wise in adopting the popular view as the readiest explanation of peculiarities of dedication and organisation, should be reminded that many of Brychan's children are now relegated by competent scholars (Mr. Egerton Phillimore and the Rev. John Fisher) to the ancient Cymric district of Strathclyde. By whichever name, that of Garthmadryn or Brecheiniog, the Welsh may have known the district, it formed during the Roman period part of the country of the Silures (whence the later Welsh Essyllwg). The mention of this brave people gives rise to all manner of ethnological conjectures based upon the description of them by Tacitus, with which we have no immediate concern here, though English visitors to Brecknockshire should always have them in mind if they wish to understand all that they see. Suffice it to say, however, that between the disappearance of the Roman and the arrival of the Norman, the history of the district is a blank. Thence it is all plain sailing. In its eastern division a congeries of manorial properties, largely dominated by two or three great baronial families, the de Bohuns and the Mortimers; in its western, Welsh lords and Welsh customs still continuing a vain struggle against the ever-aggressive English men and manners. These distinctions, if not obliterated, were reduced by the policy of the Tudors and the formation of the modern county, but a discerning eye will note how the peculiar features of church and castle still bear traces of the enduring influences of race. Perhaps in no county of Wales are Welsh and English upon better terms. The points of difference between the Celtic and the Teutonic character have not been accentuated here; it is the contrary that has happily happened. Brecon, nevertheless, remains a border district, and for that reason it will long retain features which make it a veritable paradise to the antiquary. This introductory sketch has assumed serious dimensions, but some such foreword is absolutely necessary to an account of the Brecon meeting of Cambrian archæologists.

The excursions commenced on Tuesday, the 19th inst. An unusually large party assembled at the open space in the centre of the town, which is known by the unexplained term of "the Bulwark," and were conveyed in brakes (brought all the way from Merthyr Tydvil in the adjoining county of Glamorgan) first to Llanspyddid Church, two miles to the south-west of Brecon. This church was annexed to the monastery of Great Malvern by Milo FitzWalter, son-in-law of Bernard Newmarch, the Norman conqueror of Brecon, probably in the year 1123. From this cause, and from false etymology, it has been thought that it was a hospitium connected with the priory, and that the real name of the parish is Llanspytty. Architecturally the church possesses little of interest; it has a nave and chancel without structural division. There is an interesting oak sounding-board, the under portion being divided into six compartments, and the surrounding framework filled with delicate carving. The church is dedicated to S. Cadoc, one of the Brychan family of saints, and in the churchyard is an incised stone, popularly called the Cross of Brychan. It stands about 2 ft. high, and bears upon one of its faces two crosses, the upper one probably earlier, though not much earlier, than the lower. There is no inscription. The stone has been illustrated in *Archæologia Cambrensis* for July, 1861, but in the drawing the crosses have been joined improperly by the extension of the vertical arm of the upper to that of the lower cross. Both crosses are cut within circles, and both are equal-armed. The upper has a small external circle at each corner. Breconshire churchyards are noted for their yew trees, but Llanspyddid is especially remarkable for their number and for the magnificent size and beauty of their growth. The next stoppage was at Aberbran, an ancient mansion of the great Brecknockshire family of Games, an Anglicised distortion of the Welsh Gam, signifying crooked or deformed. The house is interesting, and, with Newton, in the outskirts of Brecon—also a residence of the Games—would no doubt well repay attention, but as much of both is still occupied as farm dwellings, they cannot be properly examined by a large party in the time at command. Trallwng, usually spelt Trallong, has a church of the fifteenth century, which was restored about fifty years ago by Mr. Buckeridge, of Oxford. It is a plain, single-chambered structure without aisles; the windows on the north and south sides are double, with trefoiled heads; the easternmost window on the north side is of peculiar form and probably follows the original design. During the restoration an inscribed stone was found built into one of the windows; it is now fixed at the western end of the church, close to the north door. The discovery proved to be valuable, inasmuch as the stone bears inscriptions in two languages, one the peculiar notched characters termed Ogam, the other Latin, the letters being what is termed minuscules. Both inscriptions transliterate each other (so far as the name of the individual commemorated is concerned), reading, in Latin, "Cunocenni filius Cunoceni hic iacit"; in Ogam, "Cunacenni fiilffeto." The party next proceeded to the site of the Roman camp of Bannium, known as the Gaer (locally pronounced Gare), at the junction of the rivers Usk and Yscir. Numerous articles have been discovered, which abundantly prove the Roman origin and occupation of this camp, a collection of which the visitors saw at a mansion called Ffrwdgrech, on a subsequent day. Amongst them was a tile marked Leg. II. Aug.; this, and a broken memorial tablet (now at another residence called Penoyer) with sufficient of the inscription remaining to show that it had been set up to a soldier of the same legion, prove the station to have been one of the second, the Augustan, legion, which had its headquarters at Caerleon-on-Usk. A chain of these fortresses, garrisoned by the auxiliaries of the legion, joined hands with those of the twentieth legion, which was stationed at another Caerllion—that upon the Dee, now Chester. The camp at Bannium measures 208 by 142 yards. The bases of the south and west portals are still *in situ*, buried beneath an immense hedge, but a little excavation revealed their true character. A clearly defined road, having every appearance of being of the Roman period, runs up to the camp. By the side of another road, now degenerated into a rough and rather dirty trackway, and not more than 200 yards from the camp, stands a stone on which can be faintly traced the figures of two persons, male and female. Tradition associates the spot and memorial slab with a vulgar murder, and has christened the stone the Virgins' stone; but it is without doubt a monument to a Roman soldier and his wife. It is figured in Gough's "Camden," and there could then be deciphered the words "CONIVNX EIUS." The stone should be removed before all traces of the figuring disappears, and another stone bearing an inscription recording the circumstances should take its place. Carefully conducted excavations at this spot could not fail to be rewarded with rich results.

After luncheon, provided by Mr. R. D. Cleasby, of Penoyre, some of the party walked back to Brecon over a hill called Y Crug, at the summit of which is an unusually well-preserved British camp. The earthen wall surrounding the hill, and the other defensive walls and ditches, can be clearly traced. The main body drove to the church of Llandevaelog fach. The church has been thoroughly restored and modernised. The churchyard contains one of the most interesting of the early Welsh slabs, now built into the wall of a small building on the south side of the church. It has been twice illustrated in *Archæologia Cambrensis*, the vols. for 1858 and 1872. The inscription reads "Briamail Flou," in letters of early date, preceded by a small cross. Mr. E. Phillimore observes that an earlier form of the name is "Brigomaglos," discovered quite recently at Chesterholm on the Roman wall ("Y Cymmrodor," xi., 84).

The party reunited at the Benedictine priory church of St. John in the outskirts of Brecon. This splendid edifice, now restored and well ordered, has been the subject of the late Mr. Freeman's enthusiastic comments in one of his ablest architectural articles contributed to *Archæologia Cambrensis* for July, 1854. The present church may have been preceded by another and probably more modest structure, for soon after the year 1100 a charter was granted by Bernard Newmarch, then safely established at the adjoining castle, conveying *ecclesiam meam apud castrum meum quod est situm in Walis in Brechenio quam ego dedicari feci in honorem Sancti Johannis Evangeliste* to Battle Abbey, in Sussex. The existing church, however, cannot date before about 1230. By that year the lordship of Brecon had passed into the hands of the Breos family, and it is probable that the William de Breos who was hanged by Llewelyn ap Iorwerth, Prince of Wales, rebuilt the church of de Newmarch in grander style. The second church in Wales in point of magnitude, in this respect falling short of St. David's alone, its exterior strikes the beholder by its massiveness and simplicity of detail, whilst its interior astonishes as much by its perfect proportions as by the beauty of its details. An adequate account of such an edifice is impossible in the space at command; many of the readers of the *Builder* are no doubt well acquainted with it, either from personal visit or from the many accounts of it that exist. The description of the church was undertaken by Miss Philip Morgan, of Brecon, and it is safe to say that never has a large party had a more accomplished cicerone. The original plan provided for two eastern chapels on each side with openings out of the transepts; those on the north side were built, but afterwards altered into one large chapel. Of the two on the south side, the exterior was pulled down most probably when much of the conventual buildings were destroyed; the other remains. It is known as "capel y cochiaid," that is, the red-haired men's chapel, and it is usually stated that this term is intended to designate the Normans. But such an appellation would have been out of date in 1230, nor is it likely that the builders, whose ancestors were really Normans, would have called one of their chapels by such a name. It is much more probable that as Welsh influence revived, as it certainly did in the neighbourhood of Brecon, this chapel was appropriated by a Welsh family who bore the name of Goch, and was thence called Capel y Gochiaid, the Gough Chapel. Mr. Freeman considered the font to be Late Norman, and it is regularly pointed to as proof of the existence of an earlier edifice; it certainly has all

the look of a Norman font. The bowl has been greatly damaged, but it is still possible to make out the scheme of ornamentation. A double string or fillet moulding, having small dots upon the moulding, runs round the upper part of the bowl in a broad twisted pattern. Below, it is divided into four compartments, within one of which can be clearly discerned an eagle with half-opened wings, symbolic of St. John the Evangelist, to whom the church is dedicated. The design in another compartment is too obliterated to admit of recognition, while the third and fourth are altogether gone. These panels are enclosed within curved double lines ornamented with dots like the moulding above, and terminating on the upper sides in zigzags, which seem to form the headdress to a grotesque face that occupies the spaces between the allegorical figures. The lower curves are continued in two straight lines bearing between them the dot ornament, and having a broader line above, this portion of the design being made to represent the mouth of the grotesque, the human character of which is made plain by two depressions forming the eyes, and two vertical lines which stand for the nose. There can be little doubt that the figures within the four compartments were different, and probably represented the prophetic vision of the first chapter of Ezekiel. The coincidence of the eagle being symbolic of St. John as well as one of the figures seen by the prophet in his vision would, doubtless, be the reason for the adoption of the particular design. Below the bowl, and around the upper part of the stem, is a beautiful arcading, the arches being round and passing over to the alternate pillar, thus forming a three-centred pointed arcade. The capitals of the arcading are plain, and in shape are flat. A rounded moulding runs beneath. The lower part of the stem is plain. The base is distinctively Norman. The architectural history of this fine church is pretty clear, and has been well worked out, but its documentary history has been too much neglected. When taken up in earnest, it will probably be found to throw light upon, and to furnish dates for, several puzzles that still await elucidation.

On Wednesday, the 20th, the first halt was called at Llanddew, the church of Giraldus Cambrensis, the great Archdeacon of St. David's.* This is certainly the most interesting parish church seen during the meeting. Its plan is cruciform, and in this respect it rivals the great Church of St. John's, of which we have just spoken. But it is so tiny that the entire structure would almost go into the northern chapel of the Brecon church. Giraldus nowhere mentions a taste for architecture as amongst his numerous virtues, otherwise we might well believe that this miniature cathedral, so unlike every other parochial church in the diocese, was the work of the strenuous and always original Archdeacon. The chancel is Early English in style, and would well fit in with the incumbency of Giraldus, who died, probably in this parish, about the year 1223. The remainder of the church is extremely rude and the work poor. The east wall of the south transept is out of line. During recent restorations a small pillar piscina was found doing duty as a sort of finial to the eastern gable, and an inscribed stone had been built into one of the walls. There are also fragments of what appear to have been the lintel of a doorway. They long acted as quoins in the eastern gable, and when removed were pronounced by the late Professor Westwood to be parts of a cross. The lintel to a now closed door on the northern side of the nave at Llanvillo Church, which almost certainly occupies its original position, bears precisely the same ornamentation, and explains the purpose of the Llanddew fragments. The pattern is a sort of Norman zigzag, and, together with the rude and massive font—the date of which is altogether conjectural—may represent a tiny Norman structure that Giraldus did not consider commensurate with his dignity or importance. The church stands at the angle of two roads, and on the opposite side of the road to the west, in the present vicarage grounds, are the ruins of one of the palaces of the Bishop of St. David's, who, in the heyday of mediæval prosperity, possessed no less than seven. A finely proportioned Gothic gateway is said by those intimately acquainted with the noble architectural works of Bishop Henry Gower (1328-1347) at St. David's and Lamphey to bear the quite unmistakable mark of his genius. At some distance off are the remains of what has been supposed to be the private chapel of the palace, but is much more likely to have been the hall; it seems to have had three windows, now too ruinated to permit even a guess as to their character. Buck shows the south wall of this building as still standing in the middle of the eighteenth century, but not a trace of it exists at present. The western wall followed the course of the modern road, and built into it, with a fine canopied archway above, is the village well. A little further along the road, at what was the north-western corner of the palace, is a three-quarter round tower, from which, along its northern side, ran the external wall of the chamber already referred to as the hall. So entirely absent are any details which would admit of the dating of the building that it is impossible to assert it to be coeval with the church, or to bring it within the incumbency of Giraldus; certainly the gateway spoken of is a century beyond his time, but the entrance to the palace, as well as the palace itself, may well have been beautified and improved by one of Bishop Gower's tastes and magnificence. The next church visited was the small, retired, and unrestored church of Llanvillo. As most of the churches around Brecon have undergone a more or less—generally more than less—drastic renewal, that of Llanvillo, though possessing, on its own merits, few claims to a visit, is of interest to the ecclesiastical antiquary. It has a rood loft still *in situ*. The loft itself is very deep from front to back, the gradual downward curve from the western front to the top of the screen being clumsily continued upward into the chancel beyond. The front has square panels below a cornice of well-executed vine leaves, and the same device appears on the top rail of the screen. The tracery in the screen has been almost entirely destroyed, with the exception of one panel on each side the centre opening. The whole is Late Decorated. The doorway leading to the loft is at an unusual distance, being not far from the centre of the north side of the nave. The present nave has been shortened for the purpose of transforming the western end into a school, a common procedure in Brecknockshire, where the provision of secular education seems to have lagged behind the thirst for knowledge. The chancel is ceiled, and the church is filled with big square pews. These monstrosities are not to be defended, but we find it in our heart to wish that the church may long resist a modern restoration. Mention has already been made of a closed doorway in the north wall, which is capped by a stone bearing a chevron kind of ornament. Llanvillo is dedicated to St. Milburga, and has its wake on March 1. Can this be an instance where St. David has had to give way to a saint more in favour with the English intruders, but where the ferial day of the disestablished Welshman had become too deeply fixed by custom to admit of change?*

At Brynllys (or Bronllys, as it is sometimes spelt) the antiquaries saw the first mediæval military structure in the week's programme. It has been well described by Mr. Clark, and as the rain fell suddenly, Mr. Clark's account was taken upon trust. The only part of the castle visible to the eye is a graceful cylindrical tower, rising to a height of about 60 ft. The interior has been completely gutted. There was no entrance on the ground level, ingress being obtained by means of a ladder to a doorway in the first floor. It is clearly of the early part of the thirteenth century. It stands upon an artificial mound, around which was a moat, now hardly traceable, and had the usual outer defences of earth, or earth and stone, which Mr. Clark ascribed to the Saxons. Bronllys Church, nearly a mile distant, has been much restored; it has the remains of a screen (now moved to the western end of the building) which has lost its carving, except in the spandrels; these and the shaftings proclaim it to have been Late Perpendicular. Close to the eastern end of the church is a detached tower of the regular Brecknockshire type; it may spare subsequent conjecture and trouble to observe that it is the erection of a nineteenth-century humorist. At Gwernyfed, a magnificent modern residence belonging to Colonel Thomas Wood, the party sat down to luncheon. The old residence of the Woods, who by marriage have inherited the estates of the great Brecknockshire family of the Williamses of Gwernyfed, remains deserted and forlorn about a mile distant. It is the finest specimen of domestic architecture seen during the week. Though not equal to some of the best surviving black-and-white houses of Montgomeryshire, it is none the less a good example of Late Elizabethan work, and deserves a better fate than to be allowed to fall into ruin. The unfortunate Charles I. was a fugitive here in 1645, after one of his unsuccessful fights. After luncheon the party proceeded to Talgarth, the head of a mesne-manor to the lordship of Brecon. The size and importance of the church of a district that must always have been sparsely inhabited, which would otherwise be a puzzle, is thus explained. It consists of nave and chancel, with south aisle extending the length of both, and a transeptal chapel on the north. The arcade consists of five bays; the piers are rude. The tower opens internally into the nave by a good Decorated arch, above which is a single light of considerable size. The original opening into the transept was closed up, probably about the middle or the end of the eighteenth century, and the room thus obtained transformed into a school; entrance to it from the church for the master, who may also have been the vicar, was obtained by opening out a passage from the chancel, thus cutting off the angle where the eastern wall of the transept abutted upon the nave wall. The south porch is Perpendicular, the exterior doorway having a continuous arch, and the interior door being of a little earlier date. The tower is of two stages, crowned by a bold and effective battlement; the belfry stage has apertures of two lights on each of its sides, and the string course of both stages is carried over the windows. The church has been well restored. The top bar of the rood screen has been preserved; the carving of vine leaves and fruit is exceedingly fine. The registers date from the year 1600, and the six bells from 1724. In this parish resided Howel Harris, the father of Welsh Calvinism; a long epitaph on the south wall of the church commemorates his virtues, and a new chapel in the village perpetuates the sect he founded. The tithes of the manor of Talgarth were granted to the Abbey of St. Peter's, Gloucester, by Bernard Newmarch. It is a circumstance worthy of the attention of the local historian that a number of the place—and personal—names given in the charter are Saxon, which would appear to point to the extension of Mercian influence further westward than has been generally suspected. The church of Llangors has many resemblances to that of Talgarth, which has just been described, especially in the tower and its junction with the nave. It is, however, not so well lighted as Talgarth Church, there being only two windows, each with double lights, on either side. On the south side the lights have cinquefoiled heads, but on the north one of the windows is trefoiled. The chancel is dark, though it is lighted from both sides; the northern window is new; that on the south has a very deep splay. The south aisle extends eastwards as far as one bay of the chancel, the opening being now filled up by the organ. The dedication is to Saint Paulinus. A recently discovered stone bearing the conjectural inscription, "Hic iacet Sillero (?Sillerd) filius Vvlmer (for Vulmer)" proved a difficult nut to crack.

One of the most striking natural features of the county of Brecon is the lake of Llangors, known also as Llyn Savaddan. It is the scene of the striking incident related by Giraldus, when the birds of the lake flocked around Prince Rhys ap Gruffudd in token of his rightful claim to the chieftainship of South Wales. In 1869 what was called a crannog was discovered on a small island within its area, and, upon excavation, the site yielded animal bones in great number. The oaken piles found in the water are said to have been pointed as though by a metal adze, but as no other traces of the presence of man were met with, it is difficult to be

* An interesting difference of opinion arose respecting the dedication of the church, the Vicar, the Rev. J. Lane Davies, contending for Llanddewi, the Church of St. David's. Giraldus gives the spelling "Landu," and explains the word as meaning "Ecclesia Dei," that is, in modern guise, Llan Dduw, the Church of God. Mr. Lane Davies denies any Welsh dedication to the first person in the Trinity. On the other hand, Mr. Edward Owen quoted an extract from the "Survey of the Bishopric of St. David's," made in 1326, where the church is called Llandow, and referred to other facts which corroborate the form and meaning given by Giraldus.

* St. Milburga, who was Abbess of Wenlock, was commemorated on February 23, according to Mr. Baring-Gould.

quite sure that the structure was prehistoric. The examination of a crannog is difficult and dirty work; and, as a rule, it can only be accomplished when the surrounding water is very low. It cannot be truthfully asserted that the visitors were very anxious to recommence excavations; besides, the season has not been a particularly dry one. The great kindness of a lady had provided tea on the banks of the lake at a point somewhat removed from the site. Archæologists are human; on this occasion they were also thirsty. They chose the primrose path of dalliance, leaving the crannog for a drier and more convenient season.

Thursday, the 21st inst., saw the party at Llanhamlech Church. Though on the old site, the present edifice is an absolutely new church, the former having become so decayed as to admit of no reparation. An inscribed stone bearing the words "[Crux] Johannis Moridic surexit hvnc lapidem," which formed the lintel to the old rectory, has been removed to the churchyard. Between Llanhamlech and Llansantffread the carriages ran along the course of the Roman road called the Via Julia Montana, passing near the village of Scethrog an upright stone propped up in the right-hand hedgerow, which formerly did duty as a garden roller. It reads "[Nemni] filius Victorini." Llansantffread (or more correctly Llansantffraid, the church of St. Bride or Brigit) church has been rebuilt from its foundations by the late Mr. S. W. Williams, F.R.I.B.A., at the cost of a neighbouring landlord. The church is celebrated as the burial place of Henry Vaughan, the religious poet of the Commonwealth period. Near the mouth of the valley called Cwm Du, is an indistinct camp said to be Roman, and as it is on the direct road between the clearly established stations at Abergavenny and Brecon, it has claims upon the attention of the antiquary. Llanfihangel Cwm Du, the church of St. Michael of the dark vale, is an interesting edifice. Internally it consists of one large and nearly square chamber, unbroken by arch or pillar, and with a flat plaster ceiling. It thus presents no very distant appearance to a Welsh Nonconformist country chapel. Built into the north wall is a Decorated arcading, and at the east end is a shallow chancel. It is evident that the church originally consisted of nave, chancel, and north and south aisles. At some probably not very distant period the nave arcading was removed; the arches and piers on the south side disappeared entirely; those of the north side were placed in the northern wall, which must have been practically rebuilt. The arcading was of great height and breadth, and therefore permitted the retention or restoration between the arches of the Perpendicular windows which had occupied the north side. These windows are of three lights and remarkable for their length. In the south wall is a large Perpendicular window of five lights, with the appearance of having had its tracery cut off at the transom; and nearer the west end is another window of three lights corresponding to those on the north side. The window of the original north aisle at its eastern end is earlier than its southern fellow. The shallow chancel is divided from the nave by an immensely wide obtuse Decorated arch of perfectly plain type. It is partially panelled with the ancient rood screen, which must have been of considerable artistic merit. The tower is of the ordinary Brecknockshire type, and, as usual, occupies the western end of the nave. An early inscribed stone commemorating one Catacus, the son of Tegernacus, supposed to have been St. Catwg, is built into a buttress on the south side of the church.

The next halt was at Tretower Castle, where is a circular keep, similar to but slightly later than that at Bronllys. It is of the middle of the thirteenth century, and is built around an earlier, nearly square, tower, which in its turn was constructed upon a large artificial earthen mound. Mr. Clark considered it "a rare, probably a solitary, example of a rectangular Norman keep, which has been gutted and its central part occupied by an Early English round tower." The change of dwelling is probably to be explained by a change of ownership; it is otherwise difficult to account for the abandonment of a more commodious abode for one that must have been less so. At a later period, that is some time in the fifteenth century, the military tower was deserted for a house which was erected within a few yards of it. Mr. J. H. Parker considered the latter to date from the fourteenth century, but this seems to be a trifle too early. It was standing in all its glory when Leland passed this way, as he terms it "a fair place belonging to Henry Vehan, Esquire." The party were next entertained at luncheon at Glanusk Park, by the President. Under a tree close to the house is a monolith, brought from the hill above Crickhowel, which bears inscriptions in Ogam and Latin. On the return journey Llanthetty Church was visited for the purpose of examining an incised stone bearing a rude cross and the words "Gurdon Sacerdos" in very early minuscules. The church has been restored, and in the process has lost all features of antiquarian interest. The next stoppage was at Pencelli, or Penkelly, Castle, now represented by a few heaps of rubbish. The castle which was the head of the lordship of Penkelly, occupied a strong position on the southern bank of the Usk, which here falls abruptly. Buck's view shows two towers and part of the south wall as standing in his time, but these have now entirely disappeared in favour of a row of farm buildings. A house with a few Tudor features occupies part of the base-court. It is stated that portions of the tower chapel have been discovered in the south aisle of the parish church, which was not visited. Llanfrynach Church was the last place of call. It has been restored. The tower, which is placed at the western end, is a fair specimen of the Brecknockshire type. An interesting stone, bearing a figure and much knot-work ornament, is preserved within the church.

The fourth and final day's excursion was to the district west of Brecon, thus introducing the visitors to a wilder tract of country than they had hitherto traversed. Their objective was the little town of Llywel, at the foot of the high and bleak moorlands that stretch to the vale of Towy, in the neighbouring county of Carmarthen. Norman power may have established itself at Brecon and at Llandovery at an early date, but the rugged district between continued to be held by the Welsh. Hundreds of years before the Normans, the Romans had driven one of their roads across the moor, establishing, *en route*, a little camp that the wildness and barrenness of the land has preserved in an unusually perfect condition. Unfortunately it was found impossible to get so far with so large a party, to the general disappointment. More time was thus afforded for Llywel and Devynog churches. Both churches contain many features of close resemblance, and have an altogether sterner character than the edifices which were protected by their closeness to Brecon. Their towers approach the Pembrokeshire type of military tower; the treatment of the stair turret in both differs from the arrangement in the other churches seen during the meeting, and it would be interesting to know whether it is general in the Welsh districts of the county. Both churches are large, consisting originally only of nave and chancel; at Devynog a south aisle was added in the fourteenth century. The English barons extended their influence into this district not so much by fighting as by the easier and more effective method of marrying the Welsh heiresses. Their presence and higher culture led to modifications of the parish churches. The present font at Devynog appears to be comparatively modern, and is ungraceful in form. Its base consists of the ancient font inverted. At Llywel are the remains of a screen. Between the two villages is that of Trecastle, where there is an excellent example of the moated mound. If the mound at Tretower, crowned as it is with the remains of a rectangular stone castle, seems to favour the post-Norman theory of its construction, the mound at Trecastle, where there is not a trace of superimposed masonry, and placed in a district to which the Norman had not penetrated until long after he had elsewhere begun to build elaborate defensive castles, makes strongly for the pre-Norman origin of these much-debated structures. A long drive brought the party to luncheon at Ffrwdgrech, where they inspected a quantity of trouvailles from the Roman camp of Bannium. Newton, a fine old house of the Games in the outskirts of Brecon, was next visited, after which followed the ancient portions of Christ's College, one of the foundations of Henry VIII., and, still earlier, a house of Dominican friars. The present chapel consists of the eastern end of the friary church. It has a range of eleven Early English lancets in the northern wall and four of similar character at the eastern end of the south side. The town of Brecon was walled, but the walls have almost entirely disappeared, and the few remains of the castle, adjoining the priory church of St. John's, have been absorbed into the grounds and outbuildings of a modern hotel. The mound here is natural. St. Mary's Church, in the centre of the town, was hurriedly visited. It deserves a closer examination than it received, for it is impossible to reconcile its present appearance with the account given of it by Mr. Freeman in *Archæologia Cambrensis*. That able writer figures it as a church with a nave and chancel, a south aisle, and a northern transeptal chapel of two bays, which he regarded as the original nave. The church has been very thoroughly restored since Mr. Freeman's visit, but the northern limb, which is now of the same length as the aisle upon the south side, has no appearance of having been lengthened within recent times. The north door, as Mr. Freeman observes, is opposite that on the south side, but his plan of the church shows it as opening directly into the nave, whereas it now gives egress from the north aisle. The tower, which stands at the western end of the building, is Transitional Perpendicular. Mr. Freeman considered it displayed strong Somersetshire influence.

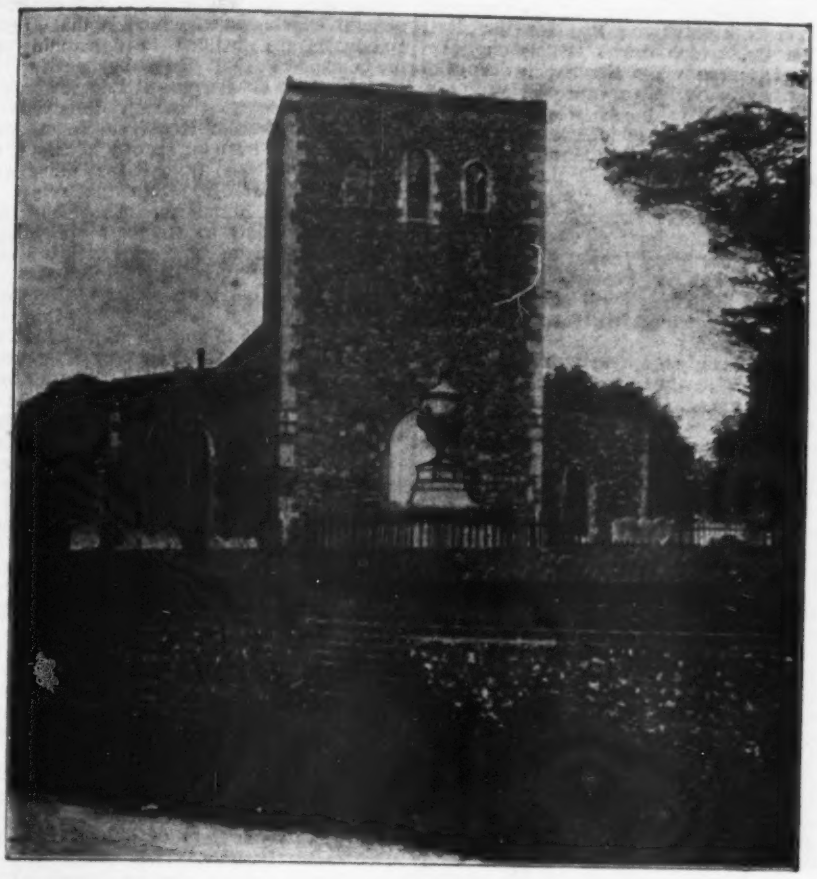
A few general words must be said upon the sepulchral effigies. These, in the district covered by the Association, are extremely few, with the exception of the priory church of Brecon; and, considering the importance and grandeur of that edifice, its monuments cannot be regarded as important. In that church is an interesting double effigy, representing a civilian and his wife, which appears to be of the late fourteenth century. Another, a wooden effigy of a lady of the middle of the sixteenth century, is the latest example Mr. Bloxam had met with of a recumbent figure carved in wood. The tomb of Sir David Williams, one of the King's justices, who died in 1613, bears a fine alabaster effigy of the knight and of his wife. Llanhamlech church contains an undated effigy to Jane, daughter of Humphrey Stanley, Earl of Derby, who does not appear in Burke. On the other hand, the churches, no matter how remote, are crowded with carved sepulchral slabs, many of them of most beautiful design and execution. These range from the sixteenth to the middle of the eighteenth centuries, their number and extent proving that the stone-carver's art had reached a high order of merit and flourished exceedingly. A beautiful example of, perhaps, the sixteenth century is now affixed to the south-western pier of the tower of St. John's Church.

The evening meetings were largely attended. The following papers were read:—"On Bannium," by Mr. Haverfield; "The Early Settlers of Brecon," by Professor Anwyl (a remarkably able essay on the ethnology of the district); "The Exploration of Clegir Voya (Pembrokeshire)," by the Rev. S. Baring-Gould; "Brecon Castle," by Mr. John Lloyd (taken as read); "Ancient Sanctuaries of Brecon," by Miss Philip Morgan; "On Brychan Brycheiniog," by the Rev. John Fisher, B.D. All the above will appear in *Archæologia Cambrensis*.

Portmadoc, in North Wales, was selected as the meeting-place for 1903.

There probably has never been an annual gathering of the Association in which the arrangements for the excursions were so admirably conceived and faultlessly executed as the one that has just closed, and while much of the smoothness was, unquestionably, owing to the hearty co-operation and active work of the local committee, it was in a still larger measure due to Lieut.-Colonel R. D. Garnons-Williams, son of the Prebendary of St. David's, who acted as honorary local secretary.

GREAT COLLEGE-STREET, S.W.—In the suit of Bradford *v.* The London County Council heard by Mr. John Troutbeck, High Bailiff for the City of Westminster, and a special jury, Miss Mary Bradford, publisher, claimed a sum of 1,227*l.* for compensation in respect of her leasehold interest in No. 9, Great College-street. The site of the house is required for the Millbank improvement scheme. The house rent is 60*l.* per annum and Miss Bradford's claim includes items of 450*l.* for the value of the premises (she having spent that sum, and more, upon improvements) and 462*l.* for profit rental. The Ecclesiastical Commissioners are the ground landlords. In the result the jury awarded the claimant 666*l.* The site of Nos. 10, 11, and 12, in the street have been taken for new offices to be erected for the Lancashire and Yorkshire Railway Company. The architects are, we gather, Messrs. Bertie Crewe and A. Shelmerdine.



Swanscombe Church, Kent.

Saxon Window, Swanscombe Church.

SWANSCOMBE CHURCH, KENT.

THESE illustrations should have accompanied the short article in our last issue, p. 168, describing the recent fire, caused by lightning, at Swanscombe Church. The view which we give of the church is from a photograph taken since the destruction of the spire. The interesting Saxon window is in the south wall of the tower.

HEALTH CONGRESS AT EXETER.

THE Royal Institute of Public Health held its Congress this year at Exeter, where over 700 delegates, representing Corporations, Municipal and Local Authorities, from all parts of the United Kingdom assembled under the presidency of the Earl of Iddesleigh.

On Wednesday last week the members of the Congress were welcomed by the Mayor and chief members of the Corporation, luncheon being provided for the whole body of delegates at the historic Guildhall of the ancient city. Among those who took part in the proceedi gs besides the Mayor of Exeter (Mr. E. A. Dunn), who presided, were the President of the Institute (Professor W. R. Smith), Sir Hy. D. Littlejohn, M.O.H. (Edinburgh), Sir Charles Cameron, C.B., M.O.H. (Dublin), the Mayor of Eastbourne, Mr. E. G. Mawbey (Borough Engineer, Leicester), Professor Sims Woodhead, and other Presidents and Vice-Presidents of sections. In the evening an Exhibition of Sanitary Appliances formed in the drill hall of the 1st (Devon) Rifle Corps was opened by the President of the Institute.

The sittings of the Congress began on Thursday with an inaugural meeting attended by nearly all the members of the Congress, and many ladies, the Earl of Iddesleigh following the Mayor of Exeter in the Presidential chair after being invested with the insignia of office as President of the Congress by the President of the Royal Institute.

Presidential Address.

Lord Iddesleigh subsequently delivered his inaugural address. He heartily welcomed the members of the Congress to their beloved city of Exeter, which seemed to have laid to heart in recent years the wise words of Lord Beaconsfield, who some quarter of a century ago had recognised the importance of the task in which they were engaging in the phrase, now famous, "Sanitas, omnia sanitas." In its recent arrangements for the supply of water and for drainage he thought the visitors would find that Exeter had done its part in regard to the two most important matters with which a municipality could be called upon to deal. The only link he could claim to have with science was his chairmanship of the Sewage Disposal Commission, and in that capacity he had learned something of the ways in which men of science worked and of the enormous difficulties with which they were confronted. He had become acquainted with certain monstrosities which had frightful names, tyrants whom they had all become acquainted with in the last few years—the microbes which dominated us, but did not condescend to become conscious of our existence. Without embarking on any detailed description of the Reports of that Commission, he would venture to indicate one or two particular matters with which the work of the Commission was concerned. A brief record of some interesting experiments made by Mr. Colin Frye as to the oxidation of sterile sewage, contained in the second Report, just published, would be found well worthy of their attention. The papers dealing with the great sewage works at Manchester were admirable, and, in passing, he desired to pay his tribute of respect to the two great communities of Manchester and Leeds, who had shown great public spirit in endeavouring to solve the difficulties attendant upon any satisfactory system of sewage disposal. Three valuable papers had been contributed by Dr. A. C. Houston, and there were many valuable observations and experiments by Professor Boyce and Drs. MacConkey, Grunbaum, and Hill, who had studied minutely the effects produced upon the bacteria contained in sewage by filtration and dilution, and upon the methods used in the bacteriological examination of sewage and effluents.

In the audience he had the honour of addressing, it was unnecessary to urge the importance of this question of sewage disposal. They would all agree that too much attention could not be bestowed upon it by those who were interested in matters of health, but there was a still more vital question, of which this was only a part, and he ventured to suggest that their most serious consideration should be directed to the whole subject of the use and abuse of the water supply. If at that moment he were an emperor, he believed he would appoint a department of Government to deal solely with water administration. They could not exaggerate the vital consequence of exact knowledge about water supply, either in respect to health or wealth. Without exact knowledge, they were in danger from recklessness on the one hand, or from fads on the other, and of the two dangers he did not know which was the more formidable.

A hearty vote of thanks was accorded to Lord Iddesleigh on the motion of Sir C. Cameron, Alderman Woodhead (Mayor of Huddersfield) seconding, and Sir H. D. Little-

john (Edinburgh), the Mayor of Margate, and the Mayor of Nelson supporting the motion.

After a brief acknowledgment by the President of the Congress, Dr. Clark, of Liverpool, rose on behalf of the Lord Mayor and the Corporation of Liverpool to invite the Royal Institute of Public Health to hold its next congress at Liverpool, an invitation which Professor Smith at once accepted on behalf of the Council of the Institute.

After the inaugural meeting, which had been held in the Victoria Hall, the proceedings of the sections began in the afternoon at the Royal Albert Memorial College, the Presidents of Sections I. (Preventive Medicine) and III. (Engineering and Architecture) delivering their presidential addresses.

Sir Charles Cameron referred in his address to some of the points in preventive medicine still in controversy between experts, among them being tuberculosis, compulsory notification of consumption, and certain causes of typhoid fever.

Engineering and Architecture Section.

The address of the President of this section was delivered by Mr. E. G. Mawbey, M.Inst.C.E., Borough Engineer of Leicester. It will be found on another page.

Typhoid Fever and Water Supply.

At the close of the address the proceedings of the section were adjourned to Friday morning, when the first paper taken was one on "Typhoid Fever in Relation to Water Supply," by Mr. T. Caink, City Engineer, Worcester. In his paper the author adduced many reasons drawn from his own experience and investigations for doubting the statement, when put as a general truth, that the typhoid case-rate of any town is a fair index of the hygienic quality of the water supply. For some years prior to 1894 the city of Worcester suffered much more from typhoid than the majority of similar towns throughout the country, and had a much higher annual case-rate and death-rate than the average of those towns. Worcester had from time immemorial derived its water supply from the river Severn, which from periods equally remote had also served as the conduit for the drainage of towns and villages along its banks. The town of Shrewsbury, high up the river, and the river Stour, which was considerably polluted with sewage and manufacturers' waste, were the great causes of pollution in the river Severn, the Stour discharging its water into the Severn only sixteen miles above the Worcester Waterworks intake. Since 1899 Shrewsbury had established sewage purification works, and now only the purified effluent entered the stream. The Worcester waterworks, designed in 1857 by Mr. Thomas Hawksley, M.Inst.C.E., and extended in 1867, had remained without further extension till 1894, prior to which period the question of abandoning the river as a source of supply had been anxiously debated by the City Council. After long discussion and various experiments, the Council decided to make the best of the existing works and materially to increase the area of the filter-beds, rejecting a scheme for securing water from artesian wells. In June of the following year (1895) Mr. Caink reported that the number of cases, which for the winter half of the four years ended March, 1894, averaged fifty-two, fell in the corresponding half-year ending March, 1895, to six. The author, during a long period in which he has been prosecuting inquiries with regard to the incidence of typhoid in towns deriving their water-supply (1) from wells sunk in the new red sandstone, (2) wells sunk in the chalk, (3) from upland sources, (4) from mixed sources, and (5) from rivers, tabulated the results and grouped them on a chart numbered 3. Briefly summarised, the average annual case-rate of Group 1, for the period 1895-1899, was 117; Group 2, 109; Group 3, 119; Group 4, 91; Group 5, 82.

Another diagram showed that London had a higher incidence of typhoid than either Worcester or Reading, both in the river-supply group. The author therefore became anxious to discover what portion, if any, of the London supply was derived from deep wells. The rates shown on Chart 3 for the Middlesex, Chelsea, and Grand Junction group, deriving from the Thames only, was sixty-four; that for the Southwark, Vauxhall, and Lambeth group, which has a small proportion of unfiltered deep-well water mixed with its filtered river supply, was eighty; that for the New River Co., with a larger proportion of deep-well water, was eighty-two; that for the East London Co., which draws largely on deep-well water, 116; while Kent, with deep-well water exclusively, had a rate of seventy-six. Taking Group A in the chart—river-supplied towns with a low incidence—the average was forty-eight, while Group B—river-supplied towns with a high incidence—the average was 182. "If it can be shown," concluded the author, "that the towns in the latter group of Class 5 (Group B) possessed inadequate provision for efficient filtration, or did not, in fact, efficiently filter their water, these towns will afford additional evidence that the typhoid case-rate is an index of the hygienic purity of the water supply. This was certainly the case with regard to one of the towns in the group,—viz., the city in which it is the privilege of the Institute to hold its Congress this year. The City Council of Exeter, recognising the insufficiency of the filtering area, and acting upon the advice of their Engineer, applied to the Local Government Board for sanction to raise a loan for improving their waterworks. The works, which included an addition of 100 per cent. to the filtering area, were completed, the author believes, about the beginning of 1901."

In the discussion, Mr. McDonald, City Engineer, Glasgow, expressed his admiration at the way in which the paper had been prepared.

Dr. Martin expressed his personal obligations to Mr. Caink for his carefully-prepared paper. The danger of the contamination of deep wells was known long before the existence of the bacillus of typhoid had been demonstrated, but the subject had not been sufficiently investigated. Near the Lake of Geneva there was a brook which ran partly down the two sides of a mountain. A large quantity of chloride of sodium (common salt) was put into the brook at one side of the mountain, and the chloride of sodium was found to be greatly increased in the spring on the other side. Subsequently several hundreds of pounds of barley-meal were put into the brook, but not a trace of the meal was discovered in the spring. That proved, thirteen years before Pasteur had developed his great discoveries, the possibility of deep-well water which seemed absolutely pure being contaminated by matters in solution.

Mr. Caink briefly replied to the observations made in the discussion.

Trade Refuse in Sewers.

Dr. Maclean Wilson, Chief Inspector of the West Riding of Yorkshire Rivers Board, was next called upon to read a paper on "The Admission of Trade Refuse to Sewers." Citing at the outset of his paper certain sections from the Public Health Acts of 1875 and 1890, from the Rivers Pollution Prevention Act, and from a number of local Acts of Parliament, to show the powers and the limitations of local authorities in dealing with trade refuse, he drew the conclusion that the law as to the admission of manufacturers' trade refuse into sewers was not clear, and that the cases so far decided in the High Courts did not carry the matter much further. The prosperity of most districts was bound up with their manufacturing works, and, therefore, many sanitary authorities had determined to admit manufacturers' trade refuse into the public sewer to be dealt with along with the ordinary sewage of their districts. But many cases had arisen in recent years in which the increased cost and the formidable difficulties caused by this admission had led local authorities to demand from manufacturers either a preliminary partial purification at their own expense or a contribution towards the extra cost incurred by the authorities in dealing with its purification. In Manchester, Bradford, and certain other great manufacturing towns, manufacturers were required to enter into agreements; some towns, like Leeds and Liverpool, prescribed certain conditions to be fulfilled before granting the privilege; while in others the manufacturers were required to contribute towards the cost of purification. Specimens of agreements entered into and of regulations drawn up by a number of the great corporations were appended to the paper, including one from a Glasgow Act of Parliament of 1898, which gave complete control to the Local Authority in this matter, and others from the Manchester Corporation (General Powers) Bill of the present year. Plans of preliminary purification works and tabulated analyses of various classes of trade refuse were also appended to the paper, the general conclusion of which is that sanitary authorities are justified in demanding that manufacturers shall partially purify their refuse before discharging it into sewers.

In the discussion which followed, Mr. Clements (Mayor of Henley-on-Thames), said the paper had been of special interest to him because he learned from it that other towns suffered like Henley from the refuse discharged from breweries. They had taken counsel's opinion as to their obligation to admit refuse from breweries into the public sewer. According to that opinion they were bound to take the refuse from old breweries, but in the case of new breweries they might be in a position to impose conditions. They were in doubt as to how far they could proceed unless they obtained certain powers under a new Act of Parliament.

Mr. Thorpe (Ripon) said that in his district they had five large varnish works, the refuse from which rendered nearly useless a sewage-farm and purification works upon which they had expended 20,000*l.* only a few years ago. He agreed with Dr. Wilson's conclusion that manufacturers should either be compelled to adopt some preliminary method of purification or be called upon to contribute to the cost of purification when it was undertaken by the Local Authority.

Mr. A. B. McDonald (City Engineer, Glasgow) said Glasgow, by the Act of 1898, had been given absolute power to exclude from their sewers whatever the Council thought proper to exclude. With its great crowd of manufacturers, Glasgow had experienced great difficulties in dealing with this question until they had obtained more complete control by the Act of 1898. They had a special arrangement with the proprietors of one great chemical works in Glasgow. They found they would be able to use the chemical refuse usefully if the discharge was under their control, but not when discharged intermittently in the manner then customary. In order to meet the Corporation, the proprietors put up works at which the Corporation was given the control over the discharges. While the Glasgow authorities thought it desirable to give all the protection they could to the community, they did not desire to put unnecessary obstacles in the way of manufacturers.

Mr. Reginald Brown, Surveyor, Southall-Norwood, said the existence of margarine works in his district had been a great difficulty. They had adopted a system of land purification, which worked well until the establishment of the margarine works; but since the refuse from these works had been admitted into the sewers the irrigation had been obstructed by a thick film of fat which floated on the surface.

Councillor Godbold (West Ham) said he was interested to know the position of those municipal bodies who did not treat their own sewage. The Corporation of West Ham had access to the Metropolitan main drainage system, and threw their sewage into the sewers of the London County Council, but they sometimes prosecuted manufacturers. Sometimes they had gas explosions in their sewers.

Dr. Wilson, replying to the various speakers, said, in answer to the Mayor of Henley, that Tadcaster had experienced the same difficulties with brewery refuse as Henley. The Urban District Council in that case had made an agreement with the brewers to pay a contribution towards the extra cost of purification. The case of Ripon, which was within his own district, was, he thought, unique. A film of varnish formed over the surface of the land on the sewage farm. Here the manufacturers had very little room for purification works, and they should be asked to contribute to the extra cost of treatment by the Local Authority. The Glasgow Act of 1898 seemed to have worked very well, and it should be made general throughout the country. By such a regulation the difficulties everywhere would be enormously reduced. The effluent from margarine works must be similar in character to that from wool-washing, which would also deposit a greasy emulsion on land to which it might be applied, but fortunately, in this case, it paid the manufacturer to treat it himself on account of the value of the grease. A manufacturer's preliminary purification works was the only remedy in the case of the margarine deposits. The refuse might be treated with sulphuric acid advantageously where, as at Southall, it was afterwards

allowed to flow over the land; to turn it into the sewer would be deleterious. With regard to the difficulty mentioned by the delegate from West Ham, they ought to be very glad of the privilege of making use of the County Council's sewers. Unless a nuisance was caused, there could be little cause for prosecution.

Refuse Disposal Plant.

The last paper read at the sitting was entitled "Recent Practice in Refuse Disposal and Steam Utilisation Plant," by Mr. F. L. Watson, A.M.Inst.C.E. (of Leeds). The "recent practice" referred to in the paper is an account of recent performances of "destructors" of the Horsfall type which have been recently erected in the Metropolis, at Salisbury, Beckenham (Kent), Moss Side (Manchester), and Accrington, Lancashire. The Metropolitan installations are at Fulham and at the Shot Tower Wharf opposite Somerset House on the Surrey banks of the Thames. The former is described as the most important electric lighting and destructor plant hitherto erected, and the latter as a recent development on account of a direct tipping apparatus which delivered the refuse from the carts into the furnace without any handling. This destructor, built for the Corporation of the City of Westminster, now that initial difficulties have been overcome is said to be giving satisfaction. Some recent applications of destructor plant are indicated rather than described, such as the crushed clinker stuff of which flags, bricks, and mortar are proposed to be made. The Salisbury plant is a combined "refuse destructor" and sewage-pumping installation, and the remainder are employed for the production of the electric light.

In the discussion which followed the reading of the paper,

The Deputy Mayor of Leicester said that at Leicester they had found great difficulty in utilising the clinker. At first they were able to sell it at a fair price, then it fell to sixpence per ton, then they had to give it and even pay for it to be taken away. In all large towns the carriage was a source of enormous expense.

The Mayor of Nelson said at Nelson they had a residium of 30 per cent. of clinker, and if any new scheme could be proposed for utilising it he would be glad to know of it. They had tried brickmaking, but it was not a success. The bricks were fragile and could not be used for many purposes. Could the destructor described by Mr. Watson be seen in operation in slab-making in any town of the United Kingdom?

In replying, Mr. Watson, the reader of the paper, said that clinker mortar was produced at the destructor works of Leeds, Oldham, and Bradford, and clinker slabs could be successfully made. They would be more durable than York stone, but were not so durable as the hardest flags. There was no town in England where the destructor was in operation for slab making. They could be made without pressure, but were not so good as pressed flags. As to the calorific value of town refuse, that necessarily differed according to the district.

The section then adjourned until Monday.

On Saturday, the President (Mr. Mawbey) and a large number of the members of the Section went on a visit of inspection to the Torquay waterworks, situated nearly midway between Exeter and Torquay, on the skirts of Dartmoor. The two reservoirs, the last of which was completed in 1884, have between them a total capacity of 297,000,000 gallons, which, at 38 gallons per head per day, is equal to 160 days' consumption for the present population of Torquay, Newton Abbott, and some smaller towns which are supplied by the Corporation of Torquay. The rapidly-growing population of Newton necessitates a further extension of the works, and it is proposed to apply in the next Session of Parliament for powers to construct a third reservoir to store an additional 200,000,000 gallons.

The sittings of the Section were resumed on Monday, when papers on the following subjects were read and discussed:—"Refuse Destructors," by Mr. W. F. Goodrich, A.I.M.E.; "Design of a Waterworks Undertaking," by Mr. Wm. Ingham, Water Engineer, Torquay; and "Mechanical Power on Tramways," by Mr. E. C. Churchward, A.M.I.C.E. (Edinburgh). Among those taking part in the discussion were the Mayor of Henley, Dr. Willoughby (Eastbourne), Dr. Cullen (Edinburgh), Councillor Pike (Torquay), Mr. Brown (Tottenham U.D.C.), who all referred to the refuse destructor question; the President, Mayor of Henley, and Mr. Clarke (Dawlish), who spoke on Mr. Ingham's paper, and all congratulated Torquay on having an efficient, as well as economical waterworks plant, and Mr. Donald Cameron (City Surveyor, Exeter), Dr. Simpson (Liverpool), and the President, who spoke on the question of tramways and electric traction.

The work of the Section was brought to a close on Tuesday, when a paper was read by Mr. Donald Cameron on "Some Points in Municipal Sanitation," and two papers on "Sanatoria for Consumptives," the first by Dr. Bushnell, and the second by Mr. Harbottle Reed, delegate of the Devon and Exeter Architectural Association. We hope to be able to print Mr. Reed's paper next week.

Municipal and Parliamentary Hygiene Section.

Mr. J. A. Bellamy (Mayor of Plymouth) opened the proceedings of this Section, of which he was appointed President, with an inaugural address on Monday, August 25. The President, taking for the subject of his address "Municipal and Parliamentary Hygiene," said he took municipal hygiene to have for its main objects the healthy prolongation of life and the securing of the health of the people and the happiness of the community. The means by which these objects could be effected were abundance of pure air and water, perfect drainage and personal cleanliness. Of the municipal machinery for effecting these objects a main factor was an Officer of Health devoted to his work, and giving up to it his whole time and all his talents. It was the business of a municipality to provide the poor with healthy dwellings at rentals which they could pay, and it was the business of Parliament to make this possible by extending the term for the repayment of loans, and to lighten as far as possible the financial burdens the municipalities would be compelled to assume. Pure water abundantly supplied and pure air provided by the multiplication of open spaces were of the first necessity. With the object of encouraging to the utmost personal cleanliness, he would like to see municipalities erecting baths in every working-class district.

The work of the Section then commenced, three papers being read in succession bearing upon the question of the "Housing of the Working Classes," the first by Mr. J. W. Spear, M.P. for Tavistock; the second, on "The Treatment of Slum Populations," by Mr. W. P. Swain, F.R.G.S.; and the third by Mr. H. Tozer, Vice-chairman of the Committee for Housing the Working Classes, City of Westminster. We shall probably be able to print Mr. Tozer's paper next week.

The discussion of the three communications was opened by Mr. Councillor Godbold (West Ham), who expressed great dissatisfaction with the slow progress being made towards solving the problem. The London County Council seemed determined to provide for the prosperous artizan rather than the poor labourer. They provided houses at rents of from 7s. to 9s. a week, but the class he desired to see provided with decent homes were the thousands of labouring men in East London whose weekly earnings only averaged from 10s. to 14s. per week. With what face could they ask a man earning 10s. a week to pay 7s. a week for rent? He was almost tired of congresses. He wanted the thing done, whether it paid or did not pay. Municipal representatives should make up their minds that the thing they wanted should come to pass, and agitate until it was done.

Mr. Sandford (Go port) wanted even more drastic measures to be tried. The prime cause, he said, of the poverty in the country districts, and urban as well, was the fact that the land itself had been wrested from its rightful owner, the nation, and was held by a small minority.

Mr. Austen Taylor (Chairman of Liverpool Housing Committee) declared that the idea of catering for the poorest of the poor without burdening the rates was impossible and might be dismissed at once. He dissociated himself from Mr. Swain's proposal to buy up the slums with a view to improving them. Slums could not be improved. They must be swept away. The truest kindness to such people was not to acquire properties which it would be a disgrace to any municipality to own, but to clear out of every city the properties which had been made insanitary, and by rehousing the people in municipal blocks, give them a chance of starting a new life under new conditions and under the strictest municipal supervision.

Mr. McDonald (City Engineer, Glasgow) related his experiences of the residuum of the population of that city. This class had to be dealt with, and he could see no reason for the hesitation shown in undertaking the task. In Glasgow they had erected a building of three stories, each with an area of 1,200 ft., in which they were able to give, without any burden upon the rates, a proper water supply and decent closet accommodation at a rent charge of one shilling per room per week.

Alderman McGuffie (Liverpool) said that in Liverpool they had no longer a housing question, but a re-housing question. When the Congress met next year at Liverpool they would be able to show them 3,000 houses in which they had re-housed the population dispossessed from the slums.

The President proposed a resolution calling upon the Local Government Board to extend the term for repayment of loans to eighty years for buildings and to 100 years for land, whereupon Mr. Austen Taylor pointed out that the Select Committee of the House of Commons sitting upon this question had definitely decided to recommend that the term for repayment should be extended to eighty years, both for buildings and land. He therefore proposed as an amendment "that this Congress urges the Government to give legislative effect at the earliest possible moment to the recommendation of the Select Committee of the House of Commons to extend the term for the repayment of loans on land and buildings to eighty years." The amendment was carried by a large majority.

On the motion of the President, another resolution was carried asking the Government to give to Local Authorities a free hand to erect such buildings as might be required by local circumstances, provided that the authorities acted in accordance with approved sanitary by-laws. The resolution was unanimously adopted, and the sitting was adjourned.

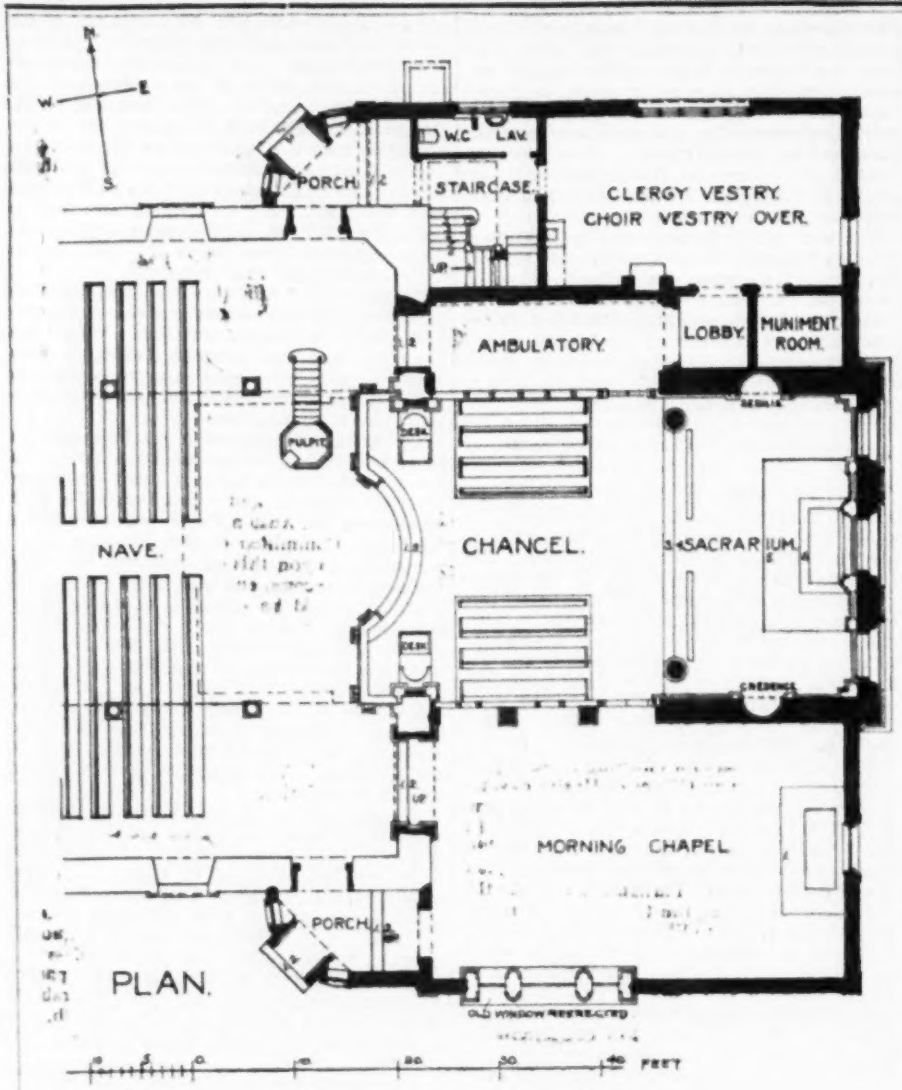
On resuming in the afternoon two papers were read and discussed urging the desirability of appointing a Minister of Public Health, and a resolution in favour of that object was adopted.

The appointment of women as sanitary inspectors was advocated by Dr. Cameron (M. O. H. Leeds). In the course of the discussion, Mr. Vacher said the Liverpool School of Hygiene was open to women as well as men, and that the former were availing themselves of it in increasing numbers.

The last paper read at the sitting was by Mr. Addiscott (Plymouth), in support of the Plumbers' Registration Bill, which had been introduced into Parliament by the Plumbers' Company. The object of the Bill was to prevent fraud and incompetence, and to give the public additional safeguards against bad work, by giving Local Authorities extended powers in supervising the work of plumbers. All plumbers who proved their competence should be registered and hold certificates which could be revoked by the authorities if a plumber was found to have violated the conditions under which his certificate was granted, or habitually doing bad work. A resolution in favour of the measure was adopted. The last sitting of the section took place on Tuesday, and was devoted to a conference on the vaccination question.

ST. ANNE'S ROMAN CATHOLIC CATHEDRAL, LEEDS.—The "first" corner stone of the new Roman Catholic Cathedral at Leeds has been laid by Bishop Brindle, D.S.O., of Nottingham. The cathedral will replace that in James-street, which the Corporation acquired at a cost of 46,000*l.*, together with the new site in Cookridge-street. The plans and designs were prepared by Mr. J. H. Eastwood, of London, in the Early English style, the estimated expenditure being 45,000*l.* It is proposed to deposit underneath the high altar the body of St. Urban, the martyr, lately removed from a Cistercian convent in the suburbs of Rome.

YORK STREET IMPROVEMENTS.—Mr. R. H. Bicknell, Local Government Board Inspector, held an inquiry at York on the 19th inst. into the application of the City Council for sanction to borrow 2,630*l.* for the purposes of their refuse destructor and depôt at Foss Islands, and 10,340*l.* for the purposes of street improvements, and also for sanction, under Section 154 of the Public Health Act, 1875, to the purchase of land for the purpose of making a new street between Minster-yard and Goodramgate. The Town Clerk (Mr. W. H. Andrew) appeared for the Corporation, and there were present Alderman Agar (Chairman of the Streets and Buildings Committee), Mr. S. Hutton (City Engineer's department), and others.



Additions, Holy Trinity Church, Clapham.

Illustrations.

ADDITIONS, HOLY TRINITY CHURCH CLAPHAM.

THE illustration gives a north-east view of new chancel, vestries, and morning chapel, now being added to the old Parish Church, on Clapham Common. The walls are faced with Hemel Hempstead bricks, and Portland and Monk's Park stone are used for the dressings. Messrs. Garrett & Sons, of Balham-hill, are the builders. The contract amount is about 6,000*l*. Professor Beresford Pite is the architect.

VESTIBULE, BROCKLESBY PARK.

THIS vestibule was built in connexion with the new hall and other buildings at Brocklesby Park. It is square on plan, with four columns and a domed skylight over the centre. The columns are monoliths of Cipollino, with caps and bases of statuary marble. The floor is paved with Cipollino and Piastriaccia marbles. The doors into the hall are of mahogany, with gilt bronze sash-bars to the upper panels and fanlight.

The architect was Mr. Reginald Blomfield, of New Court, Temple; the contractor Mr. Hunt, of Hoddesdon.

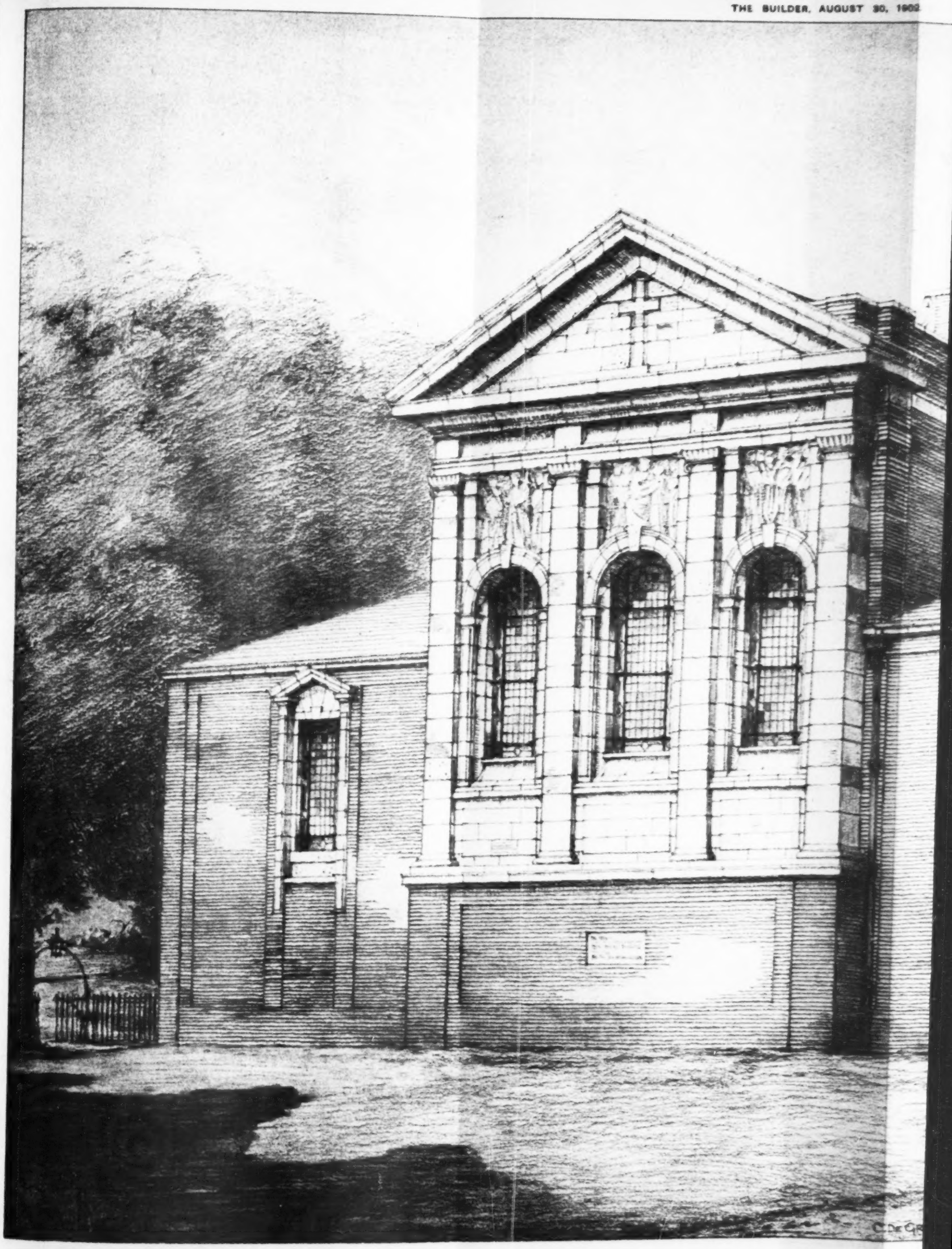
FONT COVERS.

THESE two plates illustrate some of the many examples of font covers to be found in English churches. They are referred to in an article on another page of this issue.

CHRIST CHURCH, GREENWICH.—Mr. Alfred Roberts has been appointed architect for the decorative repair and improvements—to include a new chamber for the organ, by Hill—of Christ Church, in Trafalgar-road, East Greenwich. The church was built, after the Early English style, in 1848-9, and has a capacity for a congregation of 1,360 persons. The district was made a separate parish thirty-five years ago.

ARCHÆOLOGICAL SOCIETIES.

NORFOLK AND NORWICH ARCHÆOLOGICAL SOCIETY.—The summer excursion of the Norfolk and Norwich Archæological Society took place on the 21st inst., when the members from Norwich, reinforced by contingents *en route*, started from Holt Railway Station in brakes and other vehicles on a tour which took in Salthouse, Cley, Blakeney, and Wiveton, and concluded at Bayfield Hall. The road taken was through Holt town and up the hill by Kelling Church, where the first sight of the North Sea was obtained, and then down to the road skirting the marsh until rein was drawn at Salthouse Church. This building, consisting of nave, aisles, chancel, and embattled tower, stands upon an elevation overlooking the ocean, its peculiarity being the lofty two-light windows in the nave. The Rev. W. B. S. Dalby read some notes descriptive of the church, which was erected by one of the Heydon family, and drew attention to the relics of its sometime grandeur, the remains of a painted screen, with figures, now used as a reredos, the shields of arms at the points of the arches in the nave, the old poppy-heads and quaint stalls, and the beautiful font, which bears the emblems of the Evangelists and those of the Passion. The chalice and paten belonging to the church were shown, and were inspected with interest. Both are the work of Peter Petersen, the Dutch silversmith, and bear his mark. Cley Church was next visited. St. Margaret's fane has often been described, and its history, so far as its architectural features are concerned, was dealt with in 1900, when Mr. J. T. Micklethwaite was invited to report upon its condition prior to an effort for its restoration. From this report Dr. Bensley read several extracts. Considerable interest was taken by the visitors in the south porch, rich in symbolic carving, the tracery of the windows of the roofless transepts, left unfinished after the ravages caused by the Black Death; the font, with its mutilated carvings of the seven sacraments; the fine old pulpit, which bears date 1611; and the ruined west porch. The inscriptions on the memorial slabs in the floor, and the brasses remaining, also came in for a due share of attention. Lunch having been partaken of at the Town Hall, a move was made for Wiveton Hall, kindly thrown open by Mr. Spurrell. This old mansion is built of white flints, with brick and stone dressings. The front shows two extensive wings, and in the centre there is a projecting porchway of two stories. In the oak-panelled hall within, Mr. R. J. W. Purdy offered a few remarks on the building and the district. He said that Wiveton was undoubtedly the settlement of Weva, mentioned in Domesday. There were two manors, one of which is now in the hands of Lord Calthorpe, while the other is owned by Sir Alfred Jodrell. On the inside of the massive front door are the initials "I.F.G.," and the date 1645. He thought this might stand for John and Frances Gifford, and there was a tomb in the church which remembered John Gifford, with the date 16—, perhaps 80, but the figures were in part obliterated. The Bucks had the house for some 200 years, but the name of Gifford was always associated with the place, from the early Earls of Buckingham downwards, and the Bucks had always called themselves Gifford. On the site of the present house the De Rooses had a smaller one in the twelfth century, and an old piece of walling outside was probably part of it. There was the usual subterranean passage beneath—certainly there was an opening in the cellar which led to somewhere. As there was a Carmelite monastery on the higher ground it was probable that the passage was part of the great drain which led from thence to the marsh. Commenting on the changes wrought in the course of the river Glaven by the movement of the shingle from Weybourne, Mr. Purdy concluded by expressing the hope that when the new map of Norfolk was issued in connexion with the Victorian history of the country, it would show that fringe of lost historical land between King's Lynn and Great Yarmouth, which contained many parishes wholly or partly swallowed up by the sea. The visitors then proceeded to Blakeney Church, a fine edifice on a lofty hill overlooking the old harbour and quay. Here Mr. J. Oldrid Scott read some notes on the building. The north-east turret, a feature of the church, was probably a sea-mark for vessels coming into the harbour from the North Sea or proceeding along the coast, and it still had a practical value in that respect, while it was also certainly once used as a lighthouse. At Blakeney, said Mr. Scott, there were only two styles of architecture represented. The beautiful groined chancel was of the thirteenth century, and the stately nave of the fifteenth; most likely the older nave was burnt down. The bases of two early English pillars remain in the aisles, and were probably utilised as pedestals for statues. The font was carved with the Evangelists and their emblems, with symbols of the Passion below. One of these latter is the sword used by St. Peter in the Garden, with the ear of the High Priest's servant still sticking to the blade. Outside, the tower buttresses bore the arms of the see of Norwich, and another shield with a dolphin, which may have had some connexion with St. Nicholas, the patron saint of the church. In a small niche in the tower were some round holes which probably contained the tapers held by mourners at a funeral. Mr. Scott also spoke of the curious arrangement at the east end, where there was once a sacristry behind the high altar. The partition having been removed, the four aumbries or lockers and a large one in the centre stand revealed. Two staples on the north side mark the place of the veil which was anciently drawn across the chancel in Lent. The chamber leading to the lighthouse turret was further described, and mention was made of the old "Priory Pew," which was supposed to have been brought from the Carmelite monastery, which stood to the southward of the church. Thanks having been given to Mr. Scott for his paper, some of the members strolled through the quaint old street to the quay, and there inspected the old Guild Hall, a vaulted building of three bays with central columns of brick, and entered by a door in a pointed arch of late character. On the far end is an opening which goes into the earth some distance and then turns to the right, believed to be the entrance to a subterranean passage. The scanty ruins of the Carmelite Priory were also inspected, and then a start was made on the homeward journey. Glandford Church had been put in the programme, but time would



NEW CHANCEL, CLAPHAM CHURCH.—Professor Beresford Pite

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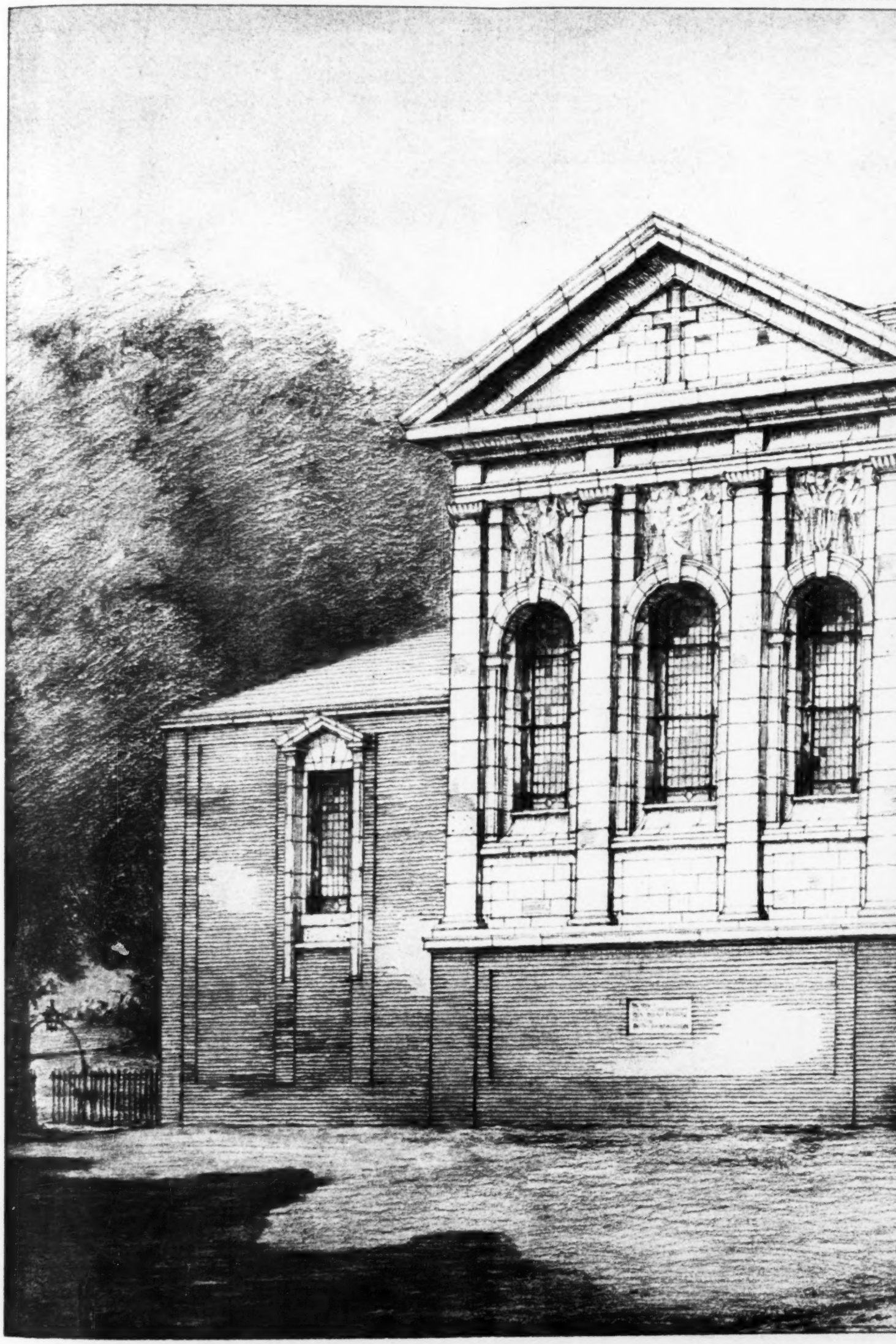
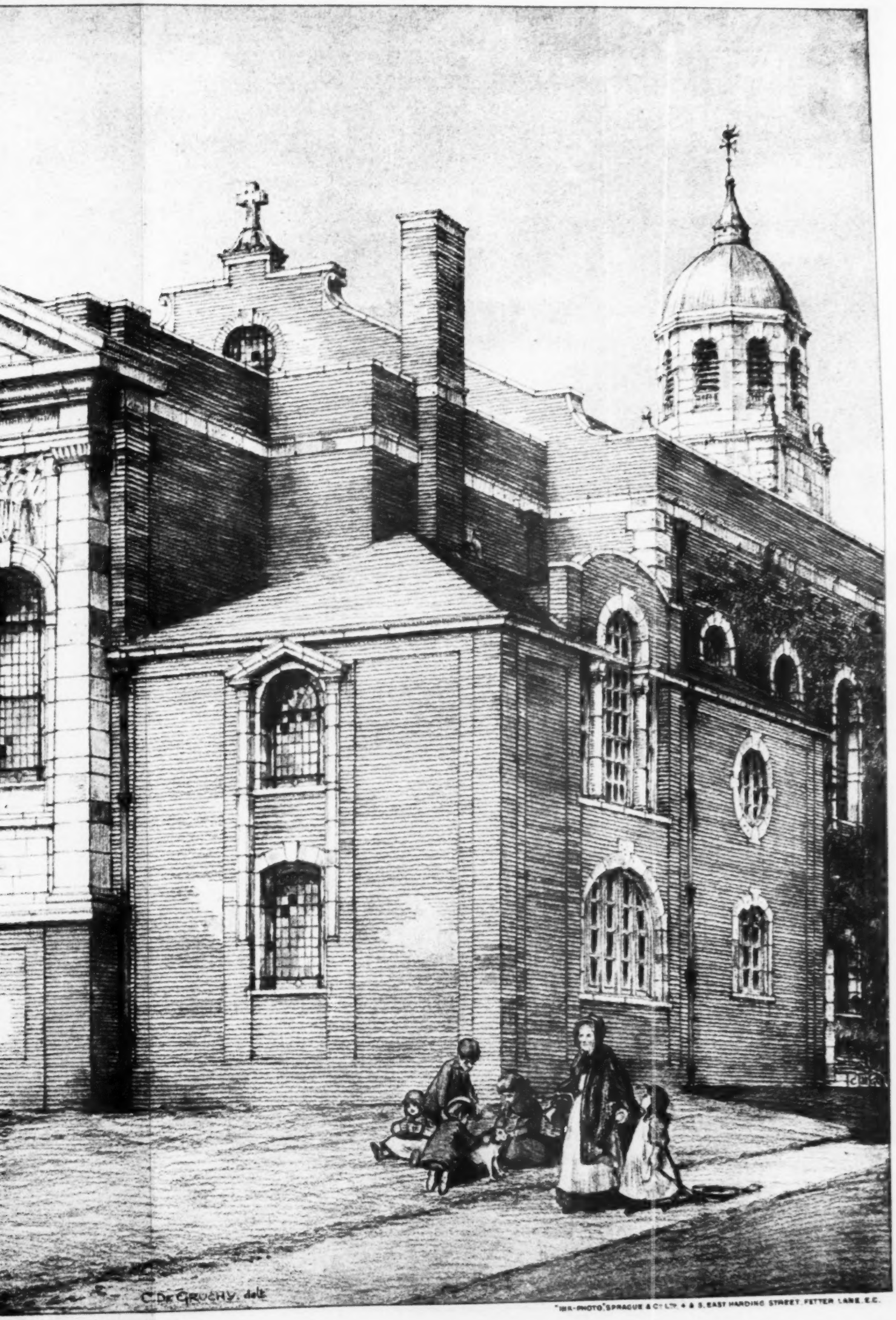


NEW CHANCEL, CLAPHAM CHURCH.—PROFESSOR



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H.—Professor Beresford Pite, F.R.I.B.A., Architect.

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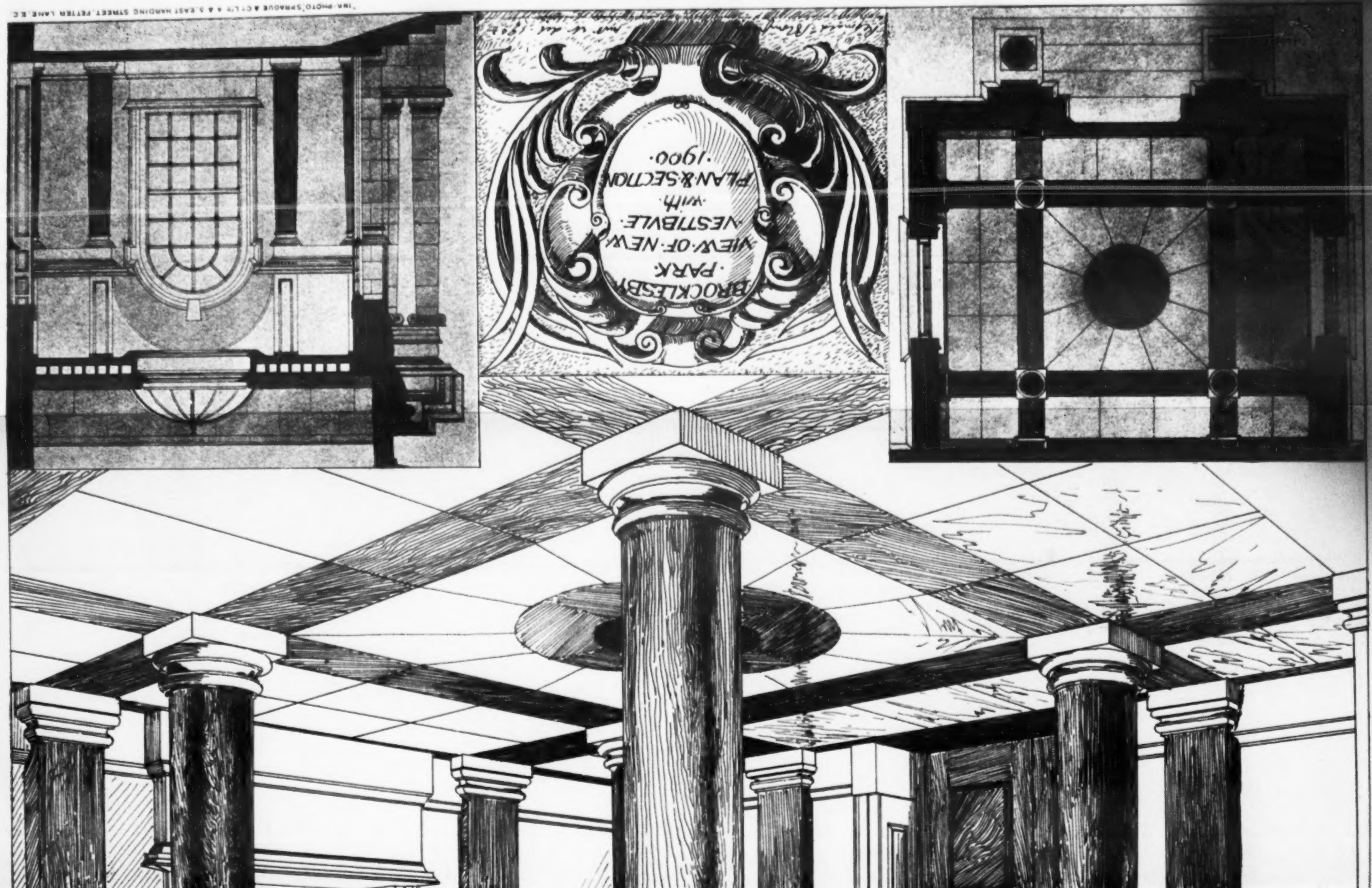

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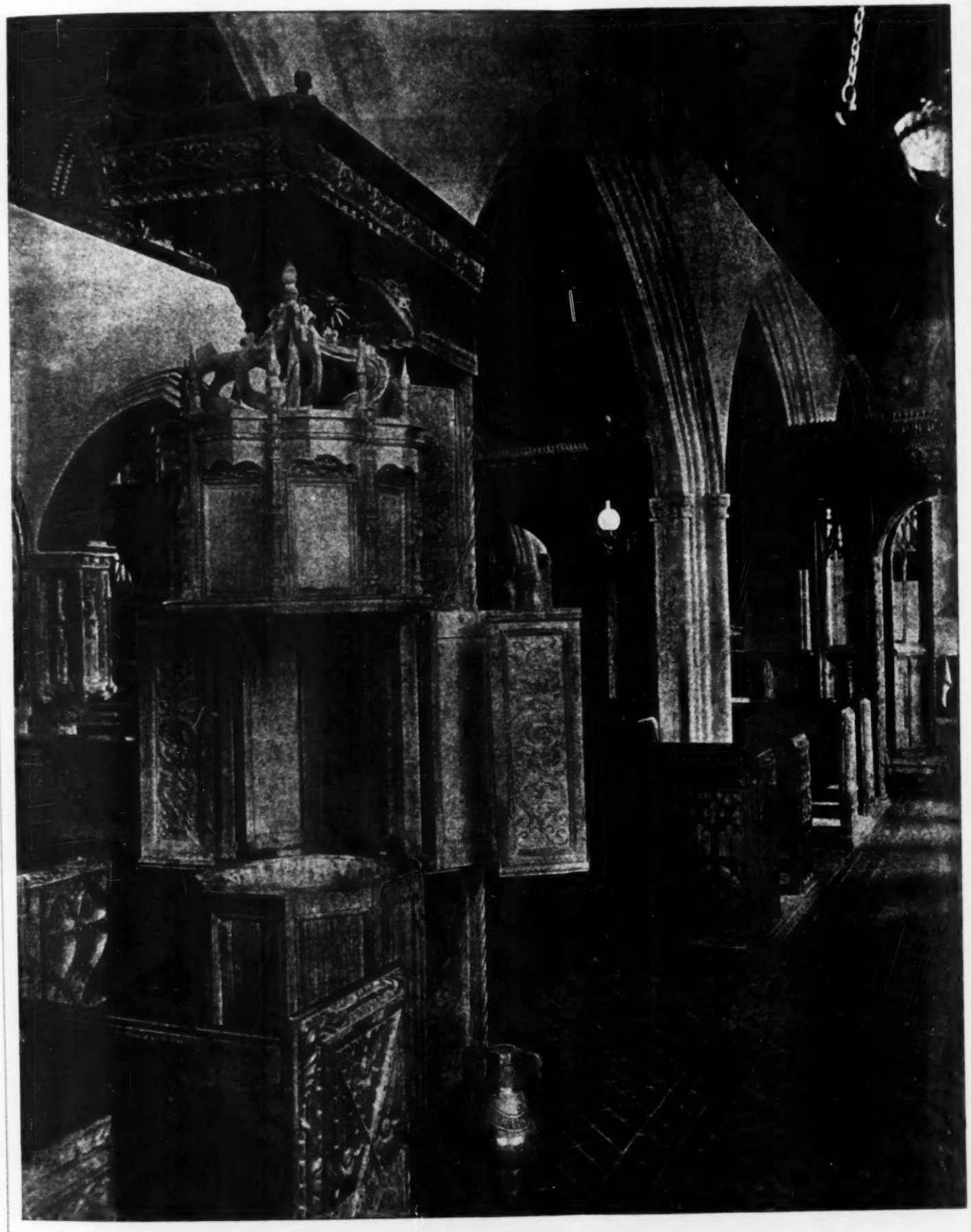
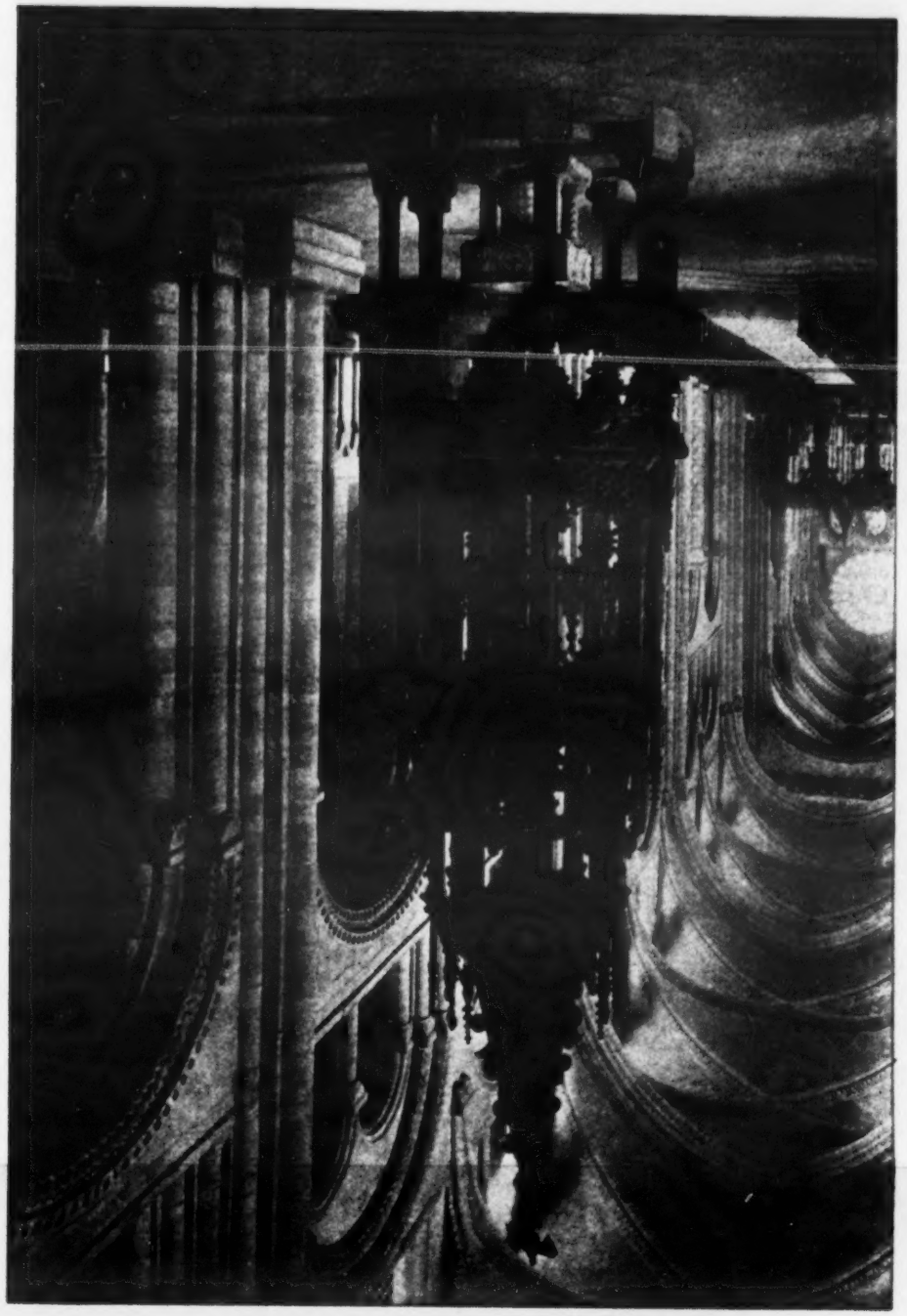


FONT COVER, SWYMBRIDGE.

DURHAM.



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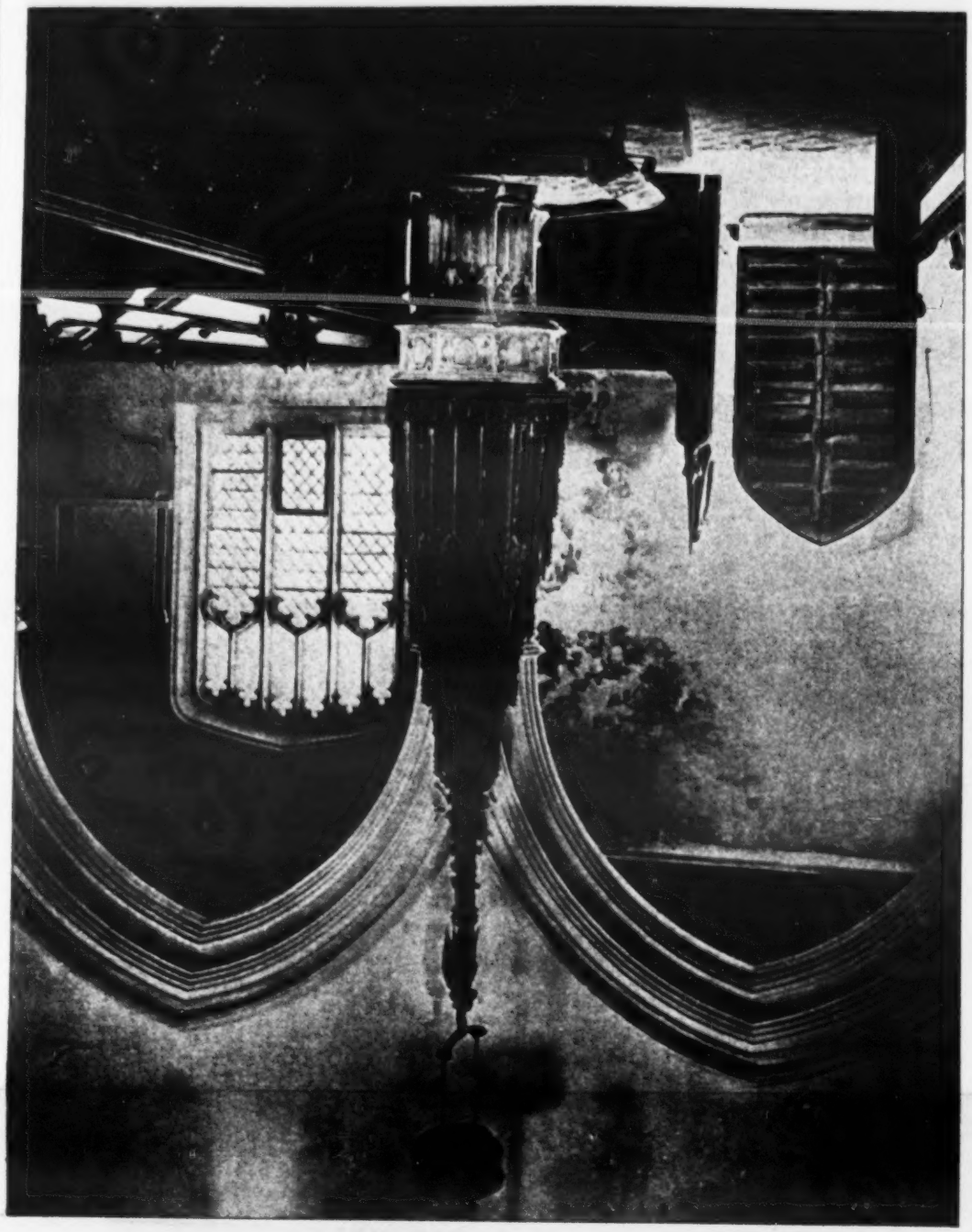

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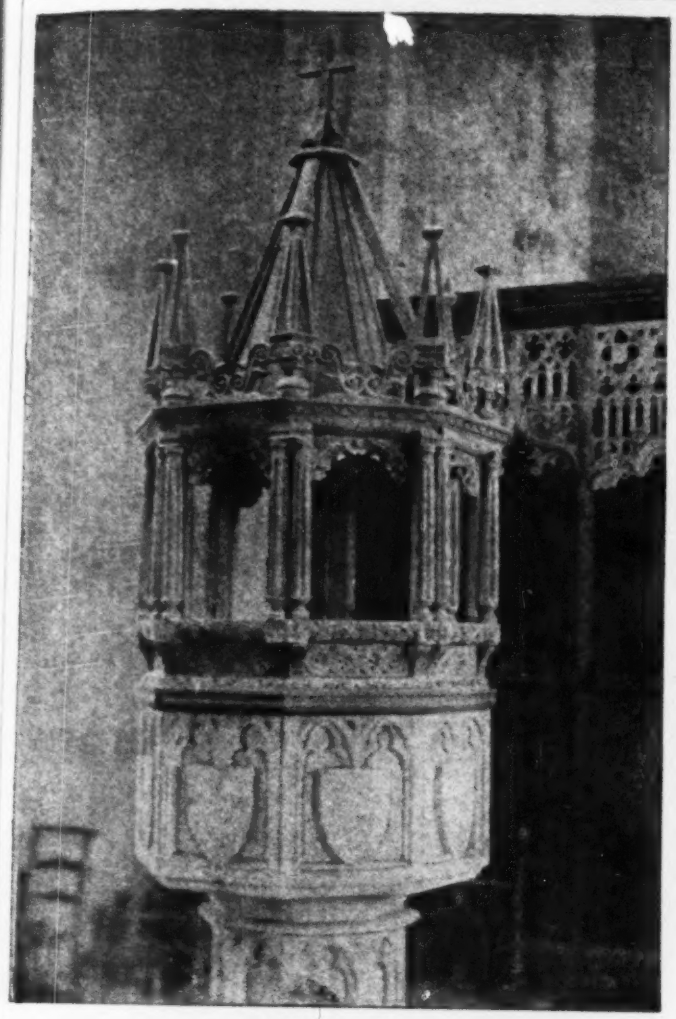

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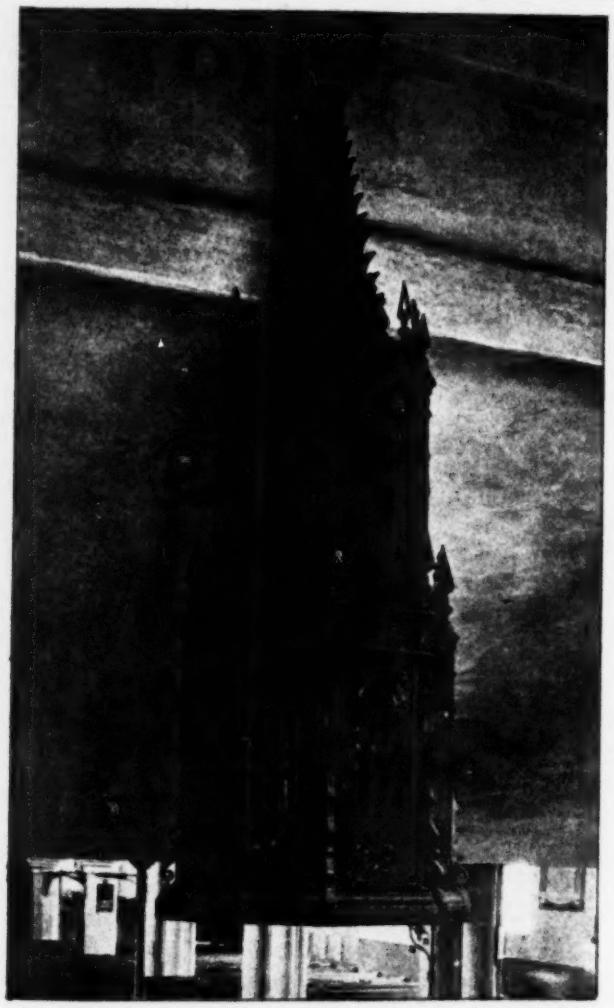

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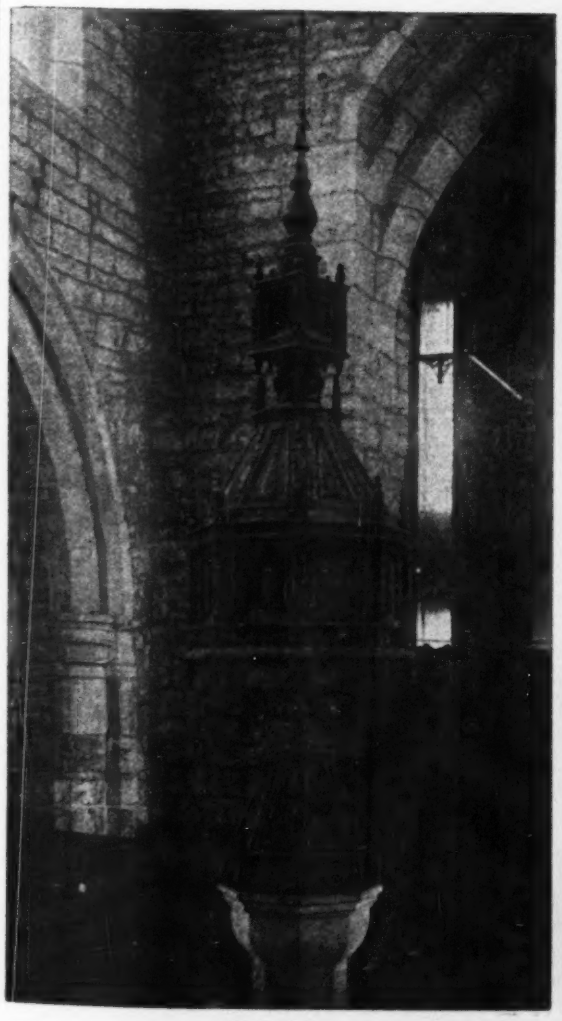

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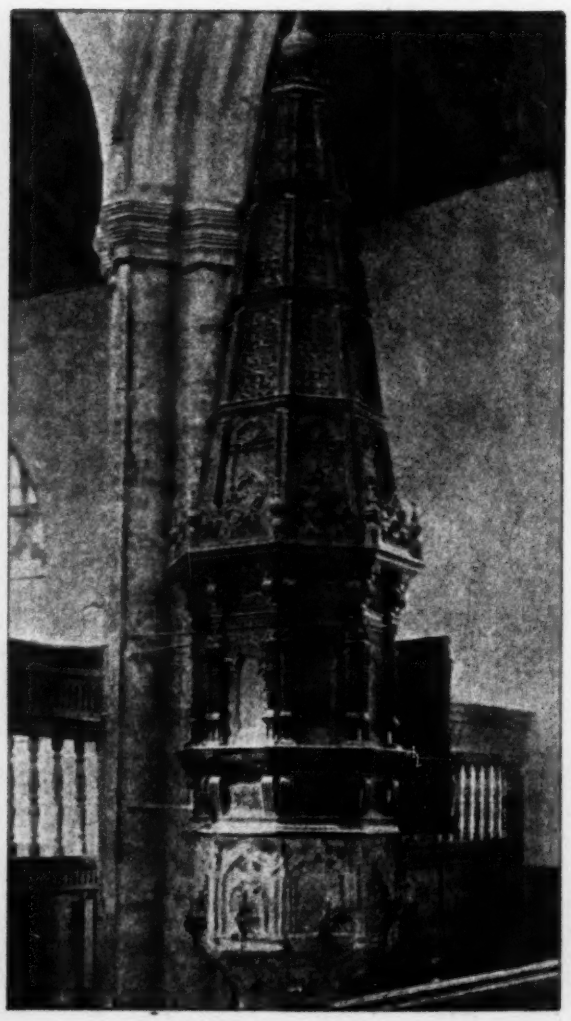

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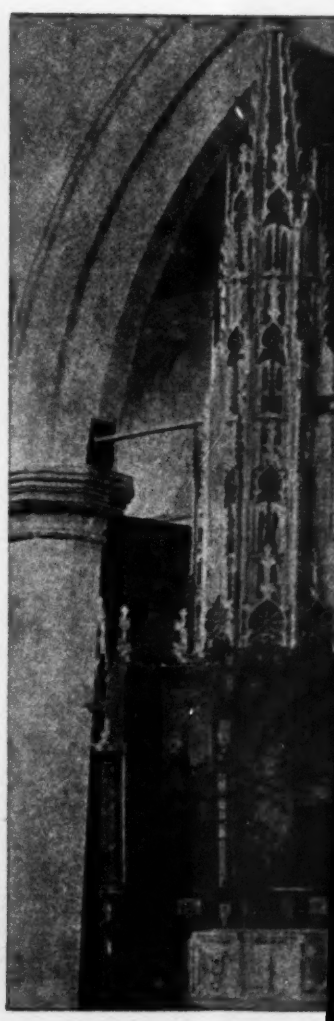

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ASTBURY.

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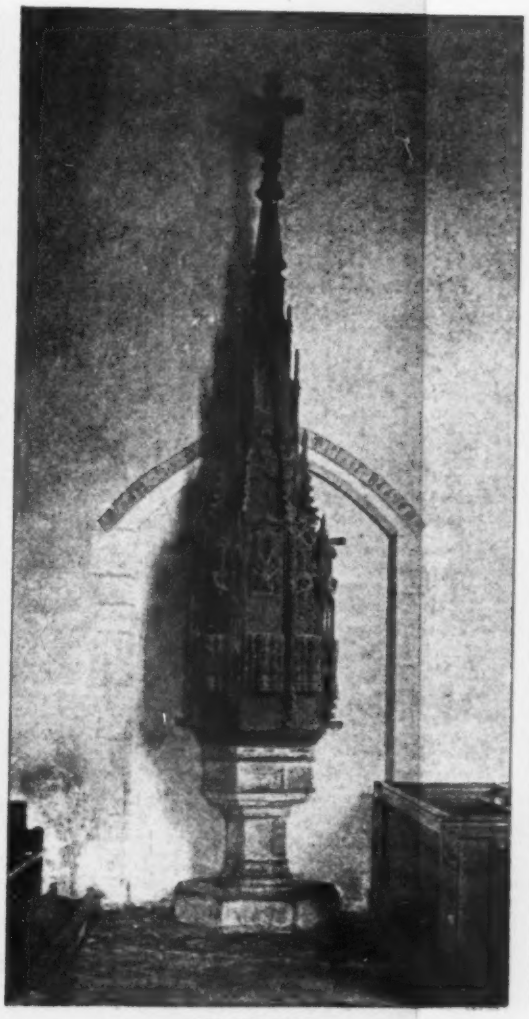

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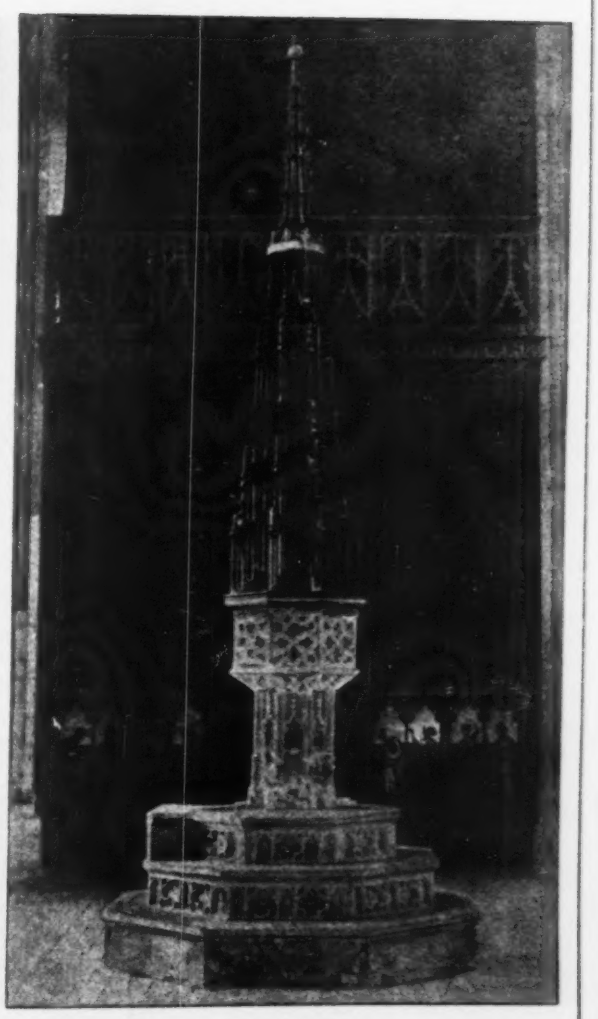

WORSTEAD.

"INK-PHOTO," SPRAGUE & Co., LTD., 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

NT COVERS.

not permit of a stay there, and reins were not drawn until the party reached Bayfield Hall, the seat of Sir Alfred and Lady Jane Jodrell, where a hearty welcome was extended to the members by host and hostess, who allowed the visitors a free range of their house, and subsequently entertained them at tea. Bayfield Hall, though an unpretending mansion externally, has no rival in the district for beauty of situation. The well-wooded lawns undulate in the most charming way, and the little river Glaven, expanding to the dimensions of a lake, completes the picture when viewed from the rising ground on which stands the ruined church of St. Margaret. Holt was reached by way to Letheringsett, and a very pleasant outing was brought to a close.—*Norfolk Chronicle.*

RUTLAND ARCHÆOLOGICAL SOCIETY.—An excursion organised in connexion with this Society took place recently, when upwards of forty members and friends paid a visit to Great Casterton. The party was first conducted over Great Casterton Church by Mr. Traylen, architect, who discoursed upon the architectural history of the building. This is one of the most interesting churches in the county of Rutland, showing much evidence of its early character. The building is thirteenth century in style, the tower, which is fifteenth century, having been inserted at the west end of the original thirteenth-century church. It was pointed out that this church was originally of the usual type of Rutland churches with a nave, a chancel, pitched roof, &c. The fifteenth-century tower has been placed upon the thirteenth-century wall, and this has caused the latter to crack on the south-west corner. It is intended to remedy this and other defects, and to preserve the interesting ancient features about the building. The church stands in the south-west corner of the site of the Roman camp, and the party proceeded to another portion of the parish where signs of the existence of such a camp were in evidence. The Rev. M. Barton, the Rev. J. Scott-Ramsay, and Dr. Newman gave some details respecting the formation of the old Roman camps, and opinions were exchanged as to the origin and use of these places. It was stated that the camp at Great Casterton must have covered an area of about 27 acres, and on some future occasion it is hoped that excavating operations will be conducted on the site, permission having been given by the Marquis of Exeter. It is recorded that a great number of old Roman coins have been and still are found in ploughing and digging in the fields in and about the village.

THE PUBLIC HEALTH CONGRESS, EXETER.

THE following is part of the Presidential Address in Section III. (Engineering and Architecture), delivered by Mr. E. George Mawbey, M.Inst.C.E., at the Annual Congress of the Royal Institute of Public Health, held last week at Exeter :—

Now what are the chief factors for health laid down by the great medical authorities throughout the world, which come within the province of our section? I venture to say that these are chiefly :—Pure air, pure water, a dry and clean subsoil, diminution of noise from the traffic in our streets, exercise and personal cleanliness, with healthy and cheerful homes and surroundings, and plenty of honest and well-directed work.

What are the works in connexion with these natural laws for health that come within our sphere, acting in our respective capacities in advising and serving the different municipalities and local authorities throughout the country? It may be stated that these are briefly :—

For pure air :—Efficient public and private scavenging, and cremation of the refuse; efficient ventilation; wide thoroughfares, with ample intercepting streets; proper construction, cleansing and ventilation of sewers and drains, and other sanitary arrangements; open spaces in centres of population; ample air spaces to dwellings and around our factories and workshops, to ensure light and air; the prevention or abatement of smoke; due restrictions upon noxious trades; electrification of our poisonous underground railways; the drainage and prevention of pollution of our subsoil; the diminution of malarial and other troubles by the reclamation of swamps, improved drainage, and the carrying-out of floods' prevention schemes.

The legislation for the latter is far from what it should be in giving facilities to small local authorities to rid their districts and inhabited areas from disastrous floods.

The supplies of pure water are to be ensured by :—The satisfactory disposal and efficient purification of the sewage of every town, village, and habitation; the prevention of fouling of our rivers, water-courses, and springs; the compulsory provision of a practically pure public water supply, not only to our large towns, but also throughout all rural districts, where large populations are now depending for their supply upon shallow and frequently highly polluted wells in close proximity to their dwellings.

There is great need for a national movement in conjunction with the Local Government Board for the better control and utilisation of our catchment and drainage areas, so as to facilitate and even enforce the joint schemes by groups of municipalities and local authorities for the supply of wholesome water within the various water-sheds of the country. Good work has been of late done by the County Councils and Rivers Conservancy Boards in the protection of the sources of water supply, especially in bringing pressure upon local authorities to deal with their sewage.

The noise in our streets can be much reduced and the sanitary conditions improved by the extended use of asphalt and hard wood pavements, which should be regularly washed as well as swept, and also by the introduction of electric traction and the perfection and development of self-propelled vehicles, with a corresponding diminution of horse traffic, with all its attendant fouling of thoroughfares.

In order to encourage exercise and personal cleanliness, ample provision of recreation grounds, gymnasia, baths and open-air bathing stations, &c., are indispensable in all thickly-populated districts.

It is notable that the architects of the present day are making an earnest study of hygiene, and are taking great pains to adopt up-to-date sanitary arrangements in the designing of dwellings and of the various buildings in which a great portion of time is occupied by people in earning their livelihood, and also in the schools for the young.

The duties of our sanitary and building inspectors are of vital importance in the carrying out, with the utmost vigilance and intelligence, of their work, not only in discovering insanitary conditions and defects in construction, but in reporting and dealing with the neglect, misuse, and mismanagement of even the best sanitary works which can be provided.

In a presidential address I cannot, obviously, undertake to deal exhaustively with these various subjects, but I will touch briefly upon two or three of them which are just now within my personal experience.

The Smoke Nuisance.

It is on such occasions as this Congress, largely attended by delegates from public bodies, that, amongst other questions, the great need should be emphasised for rigorously enforcing the provisions of the Public Health Act, 1875, for the prevention or abatement of smoke nuisance. This is highly necessary in the interests of health alone, but is hardly less so from the aspect of injury to, and disfiguration or defacement of, the beauty of our towns, the destruction of vegetable life, or the gloominess of the atmosphere. The reduction of smoke from domestic fireplaces is a very difficult problem for the future, although much has already been effected by the extended use of gas stoves and smoke-consuming grates; but it is the trade chimney-stacks that do the chief mischief, and I venture, from practical experience, to say that it is readily preventible to a sufficient extent without retarding and injuring trade interests, and further that it pays well to adopt the remedies in the saving effected by the more complete combustion of coal instead of charging the atmosphere with hundreds of tons of imperfectly consumed fuel in suspension.

The chief remedies are: sufficient boiler capacity to avoid being compelled to be almost continuously stoking boilers for all they are worth, resulting in the unavoidable issue of black smoke; the provision of automatic stokers and means for the auxiliary supply of oxygen to the furnaces; chimney-stacks of sufficient capacity and height for the horse-power required; and the employment of duly-qualified and careful men, together with proper supervision. To prevent smoke it is necessary regularly to maintain a high temperature in the boiler furnaces by careful and economical stoking combined with a uniform and ample supply of air, partly heated by the furnace in its passage thereto, and so admitted as to combine with the hydro-carbons given off. I have frequently seen these desired results brought about in Leicester and other towns, and there is now no lack of knowledge for advice, or of well-tried apparatus available.

Sewer Ventilation.

At the Congress last year I had the honour of dealing with the exhaustive tests in sewer ventilation which I had carried out at Leicester, and of the system there adopted, viz., the abolition of surface ventilating grids and the substitution of pipe shafts. This system is being extended in Leicester. No open grids are put on any newly-constructed public or private sewers, but they are ventilated by shafts alone; and as each well-grounded complaint arises the open grid is, after due investigation, abolished and a shaft provided. We have good reason to believe that this system, with a most thorough, frequent, and regular system of flushing of the sewers, is successful, and, where adopted, it has put an end to the numerous complaints of nuisance. The system now obtains to a more or less extent in many towns and districts throughout the country. It will also be remembered that this subject was considered of so much importance at the last Congress that a joint meeting of sections, at which I had the honour of presiding, was held, and the great concensus of opinion, largely voiced by eminent medical officers, as well as engineers and others, was that these grids were a source of nuisance, contributed to ill-health, and should be abolished.

This brings me to the very able paper which was then read by Mr. I. Shone, C.E., on "House and Town Drainage Systems of the Twentieth Century," in which he dealt with a new system of mechanical sewer ventilation which he had invented. I introduce this partly for the purpose of saying that arrangements are made for a practical test of this on a comparatively small section of sewers at Leicester. It is claimed for the system that it removes, dilutes, and diffuses gases from sewage continuously, without detriment to the health, or offence to the senses, of the community, and that it is entirely independent of, and superior in force to, the variations of the outside air and the air inside the drains and sewers.

In the experiments which it is proposed to carry out at Leicester, the inventor estimates that a volume of 2 cubic feet of air per minute will be drawn through the drains and sewers for every house included in the area affected. An electric fan situated in a chamber under the footway will extract the air from the sewers and discharge it through a standard ventilating shaft sufficiently high to expel the air above the level of the houses adjoining, inlets for fresh air being provided on the top of all the private ventilating pipes in place of the ordinary cowls or terminals, giving a constant current of air through the house drains in the direction of the flow of the sewage. This arrangement applies to the system of house drainage adopted at Leicester, viz., that in all cases where drains do not pass under the houses, the intercepting trap is allowed to be dispensed with: but wherever drains do pass under houses, or in any case where the owner prefers it, the intercepting trap is used. In Mr. Shone's system, the intercepting trap arrangement is specially provided for, so as to admit the fresh air to the sewer at the end of the drain on the sewer side of the trap. It is proposed that very exhaustive and complete tests shall be made of this system, the results of which will, I hope, be made known in due course.

Old Branch Sewers.

One of the most necessary but too often neglected sanitary works, in addition to providing new main intercepting sewers of towns, is to clear out all the defective old branch sewers, which, although they may appear to be serving their purpose of carrying the sewage to the main sewers, are, nevertheless, through leakage and defective construction, great sources of danger by constantly polluting with sewage and foul air the subsoil around the habitations of the people. This, having regard to the well-established fact of extensive circulation of ground air, and the induced inward currents caused by the warmer and lighter air within houses, is an important matter. This pollution has been vividly exemplified in

Leicester, where, our system of new main intercepting sewers being completed at a great cost, we are undertaking the abolition of nearly thirty miles of old, defective tributary brick sewers of small diameter, laid about the middle of the last century, replacing them with new sewers constructed of glazed stonewate pipes with patent water-tight joints. We have already completed about nine miles of this work, and in nearly every case have found, nor only large deposits of sewage sludge in the old sewers, but also that the ground around and underneath was saturated and highly polluted with sewage matter, which in some cases percolated into the ground for a considerable depth below the old sewer. In all such cases this polluted soil has been removed, in addition to the old sewer itself. Such a condition of subsoil must obviously be prejudicial to health, and it is most desirable that Local Authorities should not rest satisfied with providing new intercepting main sewers only, but should also abolish their old and defective branch sewers, to which the house drains are connected, and which are in such close proximity to the houses and properties they serve.

Purification of Sewage.

There is, perhaps, no more difficult problem to be solved than the successful purification of sewage, and certainly nothing has given so much hope of a satisfactory solution of the difficulty as the recent experiments which have been conducted on bacteriological lines. In the past many methods have been tried with more or less success, but none have been supported by scientific investigation to the extent accorded to this system. Exhaustive experiments have been carried out on bacteriological lines in many towns in this country, especially in Exeter, Manchester, Leeds, and under my own direction at Leicester. The particulars and results of the Leicester experiments were fully set forth in the Report I prepared thereon, and largely embodied also in the evidence I had the honour of giving before Lord Iddesleigh's Royal Commission on Sewage Disposal. The workers in the bacterial purification of sewage have become very numerous, but one may fairly mention broadly such distinguished men as Klein, Houston, Frankland, Roscoe, Woodhead, Parry Laws and Andrews, Dibdin and Thudicum, Clowes, Dupre, Adney, Rideal, Scott-Moncrieff, Waring, and Ducat, and the well-known eminent officers of Lord Iddesleigh's Commission.

Much credit is also due to Mr. Cameron, the late City Surveyor of Exeter, for the untiring energy and ability with which he has devoted himself to his now famous idea of adapting to modern bacteriological practice the septic action which has for ages past prevailed in the old and familiar cesspool, but with this difference, that, although some advantage was derived from partial liquefaction of solid matters in those cesspools, they were a source of great danger to health from defective design and construction, and from their close proximity to dwellings and sources of drinking water, and the offensive overflowing liquid therefrom dangerously polluted the neighbouring ditches and brooks; whilst Mr. Cameron's septic tanks, with his excellent automatic appliances, are so designed, arranged, and located as to effect a large amount of liquefaction of suspended matters without the drawbacks and dangers peculiar to the old cesspool. The effluent from the septic tanks which is usually then treated on bacteria beds on the intermittent contact system as introduced and developed by Dibdin, is passed through one, two, or three beds successively, according to the strength of the sewage, in order to reach the necessary standard of purity. The continuous process of slow filtration through bacteria beds is now also much advocated by some; it is really the old system of filtration, but adapted to modern practice. It has not yet, however, made such successful headway as the contact or intermittent system.

Broadly speaking, the respective artificial bacterial systems, apart from land treatment, which are now practised, may be grouped as follows:—

Ordinary subsidence tanks of comparatively small capacity, followed either by contact beds or continuous filtration in beds; open or closed sceptic tanks, followed by contact beds or continuous filtration beds; contact beds or continuous filtration alone.

In some towns where the trade liquids render the sewage very stubborn to treatment, some preliminary chemical precipitation, in conjunction with subsidence tanks and contact beds, or continuous filtration beds, has been resorted to. These artificial processes are defined and dealt with in detail by the present Royal Commission.

There are several combinations of these systems which cannot be done justice to in the scope of this address; but from my own experiments, extending over a period of thirteen and a half months, treating volumes of 60,000 to 467,000 gallons per day by seventeen different processes, I have been led to certain conclusions, which I will briefly refer to, viz.:—

That neither contact beds nor continuous filtration beds, without previous treatment of the sewage, will be permanently successful unless the sewage is extremely weak and largely free from matters in suspension.

That open or closed detritus or subsidence tanks, with a capacity of about one-sixth of the dry-weather flow per day, in conjunction with first and second and, where necessary, third contact beds, effect a thoroughly efficient purification, and in these experiments gave, with two contact beds, an average purification of 83·12 per cent. in albuminoid ammonia, and 90·15 per cent. in oxygen absorbed, at 80 deg. Fahr., in four hours, the average strength of the crude sewage being 1·2481 grains per gallon of albumenoid ammonia, and 7·5929 grains per gallon of oxygen absorbed. The same process, but with the addition of a third contact bed, gave an average purification of 86·74 per cent. in albuminoid ammonia, and 91·32 per cent. in oxygen absorbed, the average strength of the crude sewage being 1·3641 grains per gallon of albuminoid ammonia, and 7·8160 grains per gallon of oxygen absorbed.

The experiments with the use of a closed detritus tank, followed by a closed septic tank, and then double-contact beds, gave an average purification of 79·91 per cent. in albuminoid ammonia and 89·72 per cent. in oxygen absorbed, the average strength of the crude sewage being 1·0094 grains per gallon of albuminoid ammonia and 7·2152 grains per gallon of oxygen absorbed; and this same process, but with the addition of a third contact bed, gave an average purification of 83·68 per cent. in albuminoid ammonia and 89·64 per cent. in oxygen absorbed, the average strength of the crude sewage being ·8837 grains per gallon of albuminoid ammonia and 7·2019 grains per gallon of oxygen absorbed. In these two last experiments, the volume treated in the septic tank for each twenty-four hours was equal to one and a quarter times its capacity in addition to the detritus tank.

Other important experiments which were carried out throughout the whole thirteen and a half months included the preliminary bacterial treatment of the sewage, with final purification on old pasture land with a heavy clay subsoil. The most successful of these was an eight months continuous test of treatment with a closed detritus tank, worked at the rate per day of six and three-quarter times its capacity, then through first-contact bacteria beds (three fillings a day), with final purification by broad irrigation on the old pasture. An average of numerous analyses gave a purification effected of 86·76 per cent. in albuminoid ammonia and 91·08 per cent. in oxygen absorbed, the average strength of the crude sewage being 1·1823 grains per gallon of albuminoid ammonia and 7·4419 grains per gallon of oxygen absorbed. It will be seen that this process of detritus tank, first-contact beds, and broad irrigation effects a purification quite equal to closed detritus tanks with triple treatment in contact beds.

For the last eleven years, the bulk of the sewage at Leicester has been efficiently purified by broad irrigation on a farm with a heavy clay subsoil; 1,350 acres have been specially laid out on a newly devised method, so that the effluent from the drains as well as from the surface can be intercepted and treated over and over again until a high standard is reached, and upon this work we expended about 60,000*l*. Owing, however, to the great increase of the population, and the abolition of a subsidiary sewage farm, it was found necessary to enlarge the system of treatment, and these experiments were carried out with the object of deciding (1) whether it would be better to increase the area of land laid out; (2) or adopt a system of preliminary clarification with subsequent final purification on the land without extension; (3) or even to adopt complete bacterial treatment to supersede the land.

The results of these experiments proved that the second mentioned scheme—viz., bacterial clarification and land—gave an effluent at least equal to the best system of bacterial treatment on artificial lines, and the utilisation of the land already laid out gives a greater certainty of permanent success than there has yet been time to establish in connexion with complete bacterial treatment.

One very important fact in connexion with this system is that the clarified effluent from the detritus tank and first-contact bed does not, when applied to broad irrigation, foul the grass land; in fact, in my opinion, it is an almost ideal process where plenty of land is available. I therefore designed a scheme of deal with our eight million gallons of sewage a day, comprising detritus tanks, with a capacity equal to one-sixth the daily dry weather flow, 12 acres of first-contact bacteria beds, the clarified effluent therefrom to be finally purified by broad irrigation, chiefly on old pasture and rye grass land. This scheme, which included some additional pumping plant and sewerage, estimated to cost about 170,000*l*., has been adopted by the Corporation, and is now before the Local Government Board. I may add that, so satisfactory has been this combined bacterial and land treatment, the Corporation have on my recommendation purchased an additional 1,269 acres of this sewage farm land which they previously held on a lease expiring in about fifteen years' time.

I will conclude this address by saying that one of the most valuable features of this and of the Sanitary Institute Congresses is the Municipal Section, securing the presence as delegates of the representatives of local government from all parts of the country, and I have found that, the more these gentlemen attend and take part in the proceedings and discussions, and the more knowledge they acquire thereby, the greater is the advance of sanitary science in the respective towns and districts they represent, and the weightier is the support they give to their officials in the furtherance of schemes, works, and movements for the health, convenience, and prosperity of their constituents.

AN APPRECIATIVE ANALYSIS OF MACADAM ROAD CONSTRUCTION.*

This short paper is the result of a remark made during the discussion on Mr. Beaumont's paper at Leicester last year. Chemists and engineers have various kinds of analysis, each kind having a particular use, and at meetings of this kind utility should form the chief factor. The chemist deals qualitatively, or quantitatively as the case may be—and the utility of his labour is often found in synthetic work. An engineer determines the function of every detail of his machine, and fashions and shapes accordingly.

Now a road is a machine. Its functions are complex, but here only the broad commonplace uses will be considered. The main function of a road is to allow the traffic to pass over it with the least possible tractive effort—or to put it another way, to allow the carriage of weight per ton with the least expenditure of energy. The class of material used, the amount of friction between the material and the wheel surfaces, and many other factors might be considered, but that is not my purpose at present.

Broadly speaking, there are two parts to be considered in the construction of a road, and there are details in each part requiring attention. In the first place, every road should have a good foundation—in fact, the author looks upon the foundation as the most important part of a road; then, secondly, we have a wearable and renewable surface of varying materials and varying thickness. These two parts of a road differ in that once the foundation is laid it ought never to be tampered with, or it should be touched as little as possible. Without a perfect foundation it is impossible to obtain a perfect wearing surface. This statement needs no proof, for the proofs are to be seen on every hand. The analysis of foundations the author will pass by and restrict his observations to the "macadam" renewable section. Seventy years ago (in 1832), when Gordon wrote his book upon elemental locomotion, urging the value of mechanical traction on common roads, he said, "The more surface resistance is reduced, the easier certainly will be the draught, and the less traction power will be required.

* A paper read by Mr. C. H. W. Biggs before the Incorporated Association of Municipal and County Engineers, at the Annual Meeting held at Bristol, July 10, 11, and 12, 1902.

This species of resistance is avoided by using hard and durable surfaces in road-making."

The macadam section of a road consists of two parts: 1. The hard wearing surface which is supposed to directly carry the load, and (2) the matrix or material filling the interstices between the hard material.

The author would like to interpolate here that in his opinion all road construction with a wearing section of the macadam pattern is, from a scientific point of view, very imperfect. Consider each of these parts. The hard wearing surface is of stone broken down to pieces of say not more than 2 in. diameter through the longest section of intermediate shapes, but with many sharp edges. The crude idea is that these stones will by some means get into the form of a mosaic with the angular sides fitting in among each other, and so interlocking the mass that separate motion is impossible. Many engineers also use stones of smaller dimensions, which shall fall into the interstices of the larger material and aid the locking process. The idea embodied in this view is not bad, but the means usually employed to carry out the actual work are bad. The author cannot, however, suggest a more perfect method except to follow the suggestion of Mr. Beaumont in his presidential address to the Society of Engineers, when he said the best way was to have every stone laid by hand. What is really wanted is a machine that will joggle the stones into a natural position, not a steam-roller which pushes the stones into a position which is not the natural interlocking one, and which does further damage in that the sharp edges of the stones are ground off and the interlock obtained is far less perfect. A nice, gentle, and for some minutes more or less continuous, earthquake under a newly installed road would provide the joggle—but then you cannot put a brake upon an earthquake, nor command it when required! At any rate, the result when the stones are in place should be to give an absolutely smooth surface, with the very slightest space between the stones so as not to break continuity of surface of the road metal.

The second part of the macadam section consists of material to fill up the interstices left between the stones, and this detail has had far too little attention paid to it. Usually the material is sand or road detritus, both of which are bad, neither having a single good property to make it acceptable for the use to which it is put. Either of these materials is easily washed in or washed out. Neither conduces to the solidity of the mass sufficient to keep the stones from motion. After the matrix has been got into position, every part of the macadam section should be similar to, and—if the author may say so—have the same specific gravity as every other part. For perfection every cubic foot of macadam should consist of the same percentages of stone and matrix, which should be disposed in similar positions.

The author has referred to a remark in the discussion last year: it was to the effect that automobiles exerted a very damaging "sucker" effect which played havoc with even the best macadam roads. This sucker effect pulls away the loose dusty matrix around the stones, tends to break the lock of the section and generally to make the road, with an insufficiently resisting matrix, merely a heap of stones and not a good road surface. The remedy in this particular is different material to form the matrix, and it would be a libel upon engineers to say or to think they cannot devise some means to overcome this difficulty. Some have seen the importance of this detail, as may be seen in the use of tar macadam, and in the more recent constructions of Mr. Hooley in Nottinghamshire. The author's text, however, is analysis, not synthesis.

In conclusion, what is the result under the present system when re-metalling a road? Submit the process to analysis. Two systems prevail—perhaps it should be said one system with a few exceptions. The old worn surface is picked by manual labour or by means of a scarifier; the new metal is thrown on, and then rolled, with the usual addition of matrix material. Now, unless stones and matrix are equally distributed over equal areas, it is absolutely impossible to so make a road that will not in a very short time wear in holes and become merely a succession of hills and hollows, every one of which accentuates enormously the wear and tear of the road, and, as remetalling is usually carried out, a good surface is impossible, there being no equality of distribution over equal areas of either old of new materials—metal or matrix.

Practically, then, the analysis comes to this, that a road consists—

1. Of a foundation which should be permanent and perfect.

2. Of a wearable section replaceable when necessary.

3. In a macadam section it consists—

a. Of angular stones of varying size from a minimum to a maximum.

b. Of a material forming a matrix for the stones.

The author also asserts that the road when originally made or after repair should be absolutely homogeneous, otherwise its lack of homogeneity leads to more rapid destruction.

Either you agree with this or you do not. If you do, you must agree that generally something needs to be done to better the surface of our macadamised roads. What exactly has to be done, and how, is for you to determine. There is a goal to be reached; there are materials to use in the details of the work in order to reach the goal. If one material is bad, try another.

INTERNATIONAL FIRE EXHIBITION.

The arrangements for the International Fire Exhibition at Earl's Court, 1903, are proceeding, the British Fire Prevention Committee's scheme having met with considerable encouragement. The Duke of Marlborough, K.G., as President of the National Fire Brigades Union, will act as Vice-President of the Advisory Council, and Mr. Edwin O. Sachs, as Chairman of the British Fire Prevention Committee, will act as Chairman of the Executive. Mr. Marsland will perform the duties of Hon. Secretary of the exhibition.

Among those who have consented to act on the Advisory Council, the majority of whom have expressed their intention, we are informed, of taking an active part in the work, are the President of the Royal Society, Sir William Huggins; the Presidents of the Institution of Mechanical Engineers, the Institution of Electrical Engineers, the Chemical Society, and the Institute of Chemistry; also Sir Douglas Fox, Past President of the Institution of Civil Engineers; and Professor Aitchison, Past President of the Royal Institute of British Architects. Among Government officials, we are informed, who will take part are Sir John Taylor, K.C.B., Consulting Architect, and Mr. Tanner, Principal Architect, to H.M. Office of Works; Colonel Bainbridge, C.B., Chief Superintendent of H.M. Ordnance Factories; Captain Thomson, Chief Inspector of Explosives; Dr. Thorpe, F.R.S., Principal of the Government Laboratories; Dr. Whitelegge, C.B., Chief Inspector of Factories; Sir James Williamson, C.B., Director of H.M. Dockyards; Mr. Gavey, Engineer-in-Chief of the General Post Office, and Sir W. H. Preece, K.C.B., Consulting Engineer of the same Department.

The historical side of the exhibition will be represented by Sir Edward Maunde Thompson, K.C.B., Director of the British Museum; Sir Henry Maxwell Lyte, K.C.B., Deputy Keeper of the Public Records. Other gentlemen whose names are included are Sir Henry Trueman Wood; Mr. Dredge, C.M.G.; Mr. Isidore Spielmann; Sir Henry Lockyer, F.R.S; Major-General Festing, F.R.S.; Professor Ray Lankester, F.R.S.; Commandatore Marconi; Sir Wyke Bayliss, President of the Royal Society of British Artists; Mr. Lionel Cust; Sir Henry Irving and Mr. Moss (of the Hippodrome). Members of the fire, salvage, and ambulance services include Major Fox, Chief of the Salvage Corps; Lieutenant-Colonel Seabroke, Chairman of the National Fire Brigades Union; Lieutenant-Colonel Dixon, and Mr. J. H. Dyer, Vice-Presidents.

Correspondence.

OSCILLATION IN SPINNING MILLS.

Sir,—Referring to the letter of "W." in your issue of the 9th inst., the oscillation of the looms themselves cannot, of course, be greatly reduced, but its effects on the floors and walls of the building may be almost entirely obviated by placing the looms on properly constructed platform supports which receive the oscillation and vibration, and destroy their further effects. These elastic platforms as employed at Paris are easily constructed either on the ground floor or the upper floors of existing buildings. They consist of a surface of armoured brick and cement construction, designed so as to properly distribute the weight of the machine or loom over a certain portion of the floor surface directly under the loom, and on this surface are arranged a certain number of india-rubber isolating blocks somewhat in the style of a railway buffer, these in their turn supporting a thin platform of steel-cored brick and armoured cement, arranged to carry the bed-plate or the supports of the machine or loom. This system, after considerable research, and experiments made with the combination of two systems, that of the Cottancin armoured platforms and the Anthoni isolating blocks, permitted the two engineers to arrive at an almost perfect result. Amongst the many applications to which these platforms have been adapted, may be mentioned that of destroying the effect of the oscillation and vibration of the Marinoni printing-machines, the rapid rotary action of which is known to be disastrous in its effects on buildings containing these machines. They have also been applied as platforms for rapid steam-hammers, and an interesting instance is that of the application of the system to the dynamos connected with the motors of the frigorific engines—of English make—employed by the Société Générale d'Alimentation for the cold storage of food-stuffs coming from the Halles Centrales at Paris, and established in the basement of the Bourse de Commerce, where all vibration from machines is absolutely prohibited.

I should be pleased to give any information in my power to your correspondent or any interested in these platforms. Of course, each special case demands studying according to its requirements. Arthur Vye-Parminter.

Paris.

BILLS OF QUANTITIES.

Sir,—On p. 169 *ante*, "R. O. D." asks a question which I will attempt to answer.

It appears that certain items shown on the contract drawings and described in the specification were omitted from the bills of quantities by the surveyor. It is usually assumed that any person performing professional work for remuneration is responsible for the accuracy of such work, and many a builder has been paid by a surveyor for errors in quantities, although such errors are very few.

It has, I think, always been assumed that a surveyor was liable for the mistakes made by him or his clerks, unless the quantities formed part of the contract. In practice, any little errors discovered during the execution of the works are adjusted in the settlement of the variations.

Great was the surprise of the profession in July, 1888, when the case of Priestley *v.* Stone, which had been decided in favour of the defendant, came before the Court of Appeal, the Master of the Rolls and Lord Justices Lindley and Bowen. It was then decided that, where an architect employs a quantity surveyor whose bills of quantities are sent out to the builders wishing to tender, there is no privity of contract between the quantity surveyor and the builder.

The custom as between surveyors and builders was not proved, so that if the builder has any remedy it is clearly not against the surveyor, according to this important decision. The qualifications of the quantity surveyor, therefore, become a matter of interest to builders.

Henry Lovegrove.

BUILDINGS IN HOLLAND.

Sir,—Can any of your readers give the names of books dealing with the churches and public buildings of Holland before the last century? Amstel.

WATERPROOFING CEMENT FOR ROOFS.

Sir,—Will any reader kindly say if there is a material which may be mixed with the finishing coat of sand and cement on a concrete roof which would render the cement waterproof in lieu of asphalting the top? A Subscriber.

STAIN FOR WOOD.

Sir,—I notice in your issue of August 16 an inquiry from "H. W. R." *re* Peter Bratch's "carbolicum." I think he must mean Messrs. Peters, Bartsch, & Co.'s preparation, known as "Carbolineum avenarius," which answers to the description he gives of the stain. Their address is, Peters, Bartsch, & Co., Derby. H. W. Dolling.

The Student's Column.

THE CHEMISTRY OF BUILDING MATERIALS.

9.—Concrete—Tar Concrete—Asphalt—Roman Cement—Plaster of Paris—Internal Plastering.

Concrete is a substitute for stone, produced by mixing hydraulic lime or cement with broken brick, broken stone, coke breeze, ballast, or other hard, insoluble, and undecomposable substance and a suitable quantity of water. Sand is also an ingredient of some classes of concrete.

The lime or cement is known technically as the *matrix*, and the inert material as the *aggregate*. The aggregate should be wetted before being mixed with the matrix, as a stronger concrete is then obtained than when water is added to the matrix mixed with a dry aggregate. Portland cement is now nearly always used as the matrix, as it is comparatively uniform in composition, and superior to any natural hydraulic lime.

Concrete and the London Building Act.—The by-laws of the London Building Act, 1894, require concrete for *foundations* to be composed of "clean gravel, broken hard brick, properly burnt ballast, or other hard material to be approved by the District Surveyor, well mixed with freshly-burnt lime or cement in the proportions of 1 of lime to 6, and 1 of cement to 8 of the other material."

For *Walls* the concrete must be "composed of Portland cement and of clean Thames or pit ballast or gravel, or broken brick or stone or furnace clinkers, with clean sand, in the following proportions, viz.:—1 part of Portland cement, 2 parts of clean sand, and 3 parts of the coarse material, which is to be broken up sufficiently small to pass through a 2-in. ring."

Concrete has been used for almost every conceivable purpose in building—foundations, floors, roofs, walls, stairs, tanks, and conduits being commonly constructed with it. The composition of the concrete varies with the nature of the work for which it is to be employed, heavy concretes being used for engineering works and light concretes for floors and roofs.

For massive structures, such as sea walls, the concrete is frequently first made into blocks in suitable moulds, and these blocks are then cemented together like blocks of stone. For walls of buildings a double-walled frame is sometimes erected in timber on the site the concrete wall is to occupy, and wet concrete is rammed between the walls of the frame. When the concrete is dry the frame is removed.

Coke-breeze Concrete.—Coke-breeze differs from most of the aggregates commonly used for concrete in being combustible. For its combustion, however, it requires a free supply of air, and when mixed with lime or cement and made into concrete, so little air can obtain contact with it that the concrete is practically incombustible.

Coke-breeze concrete should not, however, be used under hearths as it has been known to become red hot and cause ignition of adjacent woodwork.

Coke-breeze is very largely used for building in London because it can be readily obtained and produces a very light concrete to which wood can be nailed. Coke-breeze concrete is, however, inferior in strength to concrete in which broken brick or stone is used as the aggregate, and the coke-breeze contains impurities which may prejudicially affect the durability of the concrete.

Quick-setting Concrete.—When it is necessary that the concrete should set very rapidly, as, for example, on sites which become covered with water at high tide, Roman or Medina cement is used, partly or wholly, as the matrix.

Chemical Composition of Concrete.—The chemical composition of ordinary lime or cement concrete is somewhat similar to that of lime or cement mortar. The siliceous matter (or carbonaceous matter in breeze concrete) insoluble in acid is, of course, higher than in good mortar, but the proportions of lime, silica soluble in hydrochloric acid, and silica soluble in caustic soda afford an indication, as in the case of mortar, of the quality of the concrete.

Tar Concrete.—Tar concrete is a concrete in which tar is used as a matrix instead of hydraulic lime or Portland cement. The aggregate consists of broken stones, shingle, or any of the aggregates used for cement concrete. About twelve gallons of tar are used for every cubic yard of concrete manufactured. The tar should be heated in open boilers at about 194 deg. Fahr. for from four to twelve hours before being mixed with the aggregate, in order to expel all water, volatile vapours, and light oils. Coal tar so treated consists largely of free carbon in a finely divided condition held in suspension in a mixture of creosote, naphthalene, and anthracene oils.

Asphalt.—Natural asphalt as found in Europe is a limestone containing a considerable proportion of bitumen, to which latter is due the deep brown colour of the natural rock. The asphalt found at Pyrimont Seyssel, in the Jura mountains of France, consists of about 90 per cent. of carbonate of lime with 10 per cent. of bitumen. The asphalt found in the Val de Travers at Neuchatel, in Switzerland, contains rather more bitumen (10 to 20 per cent.) than that found at Seyssel. Asphaltic rock is found in many parts of the world, but varies largely in its composition in different localities.

The bitumen found in asphalt consists of a complex mixture of liquid, semi-solid, and solid hydrocarbons. The ultimate composition of natural bitumen is variable, but the approximate proportions of the elements in a normal sample of bitumen are 84 per cent. carbon, 11 per cent. hydrogen, 4 per cent. sulphur, and 1 per cent. nitrogen.

Until recently very little was known regarding the chemical composition of asphalt, but the results of an exhaustive investigation into the nature and origin of asphalt were communicated to the Society of Chemical Industry in 1898 by Mr. Clifford Richardson, and those interested in the subject will find much interesting information in his communication. Incidentally Mr. Richardson points out that oxygen is very rarely present in bitumen, although that element has hitherto been commonly regarded as a normal constituent of natural bitumen.

The natural asphalt of Trinidad contains practically no lime, but a large proportion of clay and free silica. Trinidad Lake pitch or asphalt consists of about 54 per cent. bitumen, 36 per cent. clay and silica, and 10 per cent. organic matter other than bitumen. Trinidad asphalt as used in England is a mixture of this natural deposit with crushed stone, chalk, or other aggregate.

In certain parts of America deposits are found which consist of almost pure bitumen. This bitumen is there commonly known as asphalt, but in this country the term "asphalt" is now usually applied to a concrete formed by mixing bitumen with an aggregate, or to any natural concrete or cement in which bitumen forms the matrix.

Methods of Using Asphalt.—For road paving, Val de Travers or Seyssel asphalt rock is ground to powder and subjected to heat in a revolving boiler, and then transferred in closed iron carts to the spot where it is to be laid. The hot powder is spread over the cement-concrete foundation of the road, and is compressed by heated iron hammers until a smooth, even surface, without cracks, and impervious to water, has been produced.

Another method of paving with asphalt consists in mixing the powdered asphalt with grit and heating the mixture in large cauldrons together with a little bitumen. The material in the cauldron is kept in a state of agitation by machinery for several hours until the mixture has been converted into homogeneous *mastic*. This mastic may be transferred direct in ladles from the cauldrons to the concrete road foundation and worked into position while liquid or plastic; but it is a more common practice to run the mixture into moulds capable of containing about 125 lbs., and allow it to cool and harden. The blocks of mastic are taken to the spot where the paving is being constructed, and are there broken up and remelted in cauldrons. Mastic blocks are manufactured in three grades: (1) asphalt without grit, (2) asphalt with fine grit, and (3) asphalt with coarse grit.

Artificial Asphalts are sometimes manufactured by boiling a mixture of coal-tar pitch with ground chalk, sand, or other aggregate. They are inferior in quality to the best grades of natural asphalt. *Coal-tar pitch* is the residue obtained when tar is subjected to distillation, and is semi-liquid while hot, but solidifies in cooling. It contains a large proportion of free carbon. Coal-tar pitch is sometimes called bitumen, but is more brittle and more readily softened by heat than mineral bitumen, and is in every respect inferior to mineral pitch or bitumen for paving.

Roman Cement is a calcareous cement prepared by carefully calcining nodules of argillaceous limestone found in the London clay. These nodules are known as "*septaria*" and consist of limestone mixed with 30 to 45 per cent. of clay. They are of a bluish-grey colour, and are calcined at the lowest temperature which will suffice to expel the carbon dioxide from the limestone. Upon calcination the material assumes a brown colour.

Roman cement has about one-third the cementing strength of Portland cement and should not be mixed with more than its own volume of sand, for a larger addition of sand renders the cement dangerously weak. Roman cement sets very rapidly and is therefore sometimes used for work which must set between the periods of low and high tide, but Portland cement is now usually employed for work for which Roman cement was formerly used.

Other forms of Roman cement made from septaria found in widely distant localities are known respectively as *Medina*, *Calderwood*, *Harwich*, *Sheppey*, *Whitby*, *Mulgrave's*, and *Atkinson's* cement. They all approximate in composition more or less closely to the Roman cement made from the septaria of the London clay.

Plaster of Paris.—Gypsum, alabaster, and selenite are three minerals having the same chemical composition. Each consists of calcium sulphate combined with two molecules of water, and is represented by the formula $CaSO_4\ 2\ H_2O$. Plaster of Paris is made by exposing gypsum to a temperature of about 110 deg. C., which causes the expulsion of most of the water and converts the $CaSO_4\ 2\ H_2O$ (gypsum) into $2\ CaSO_4.H_2O$ (plaster of Paris).

When the gypsum is heated to a temperature of over 200 deg. C., all the water is expelled, and the sulphate of lime which remains is "dead burnt," takes up water very slowly, and refuses to set.

When properly prepared plaster of Paris is ground to a fine powder and mixed into a paste with water it combines with part of the water to again form $CaSO_4\ 2\ H_2O$, and rapidly sets to a hard mass. As the liquid paste of plaster of Paris solidifies, it evolves heat and expands.

In order to produce a plaster which sets harder and less rapidly than plaster of Paris, the gypsum before calcination may be mixed with alum, borax, or carbonate of potash.

Keene's Cement is made by soaking gypsum with a solution of alum, drying the mixture, then calcining it as in the manufacture of ordinary plaster of Paris, and finally grinding the calcined residue.

Parian Cement is manufactured by calcining a mixture of gypsum and borax.

Martin's Cement is produced by calcining a mixture of gypsum and carbonate of potash.

Stucco is a name applied to any calcareous plaster or cement used for covering walls. The hydraulic lime or cement at one time largely employed for covering external walls is called stucco, and the same term is applied to the mixtures of lime and plaster used for producing smooth surfaces on internal walls.

Internal Plastering.—Materials of widely different composition are used for internal plastering, and it would be difficult to give a better description of the composition of plaster of a satisfactory character than is contained in the following extracts relating to plastering from the By-laws of the London Building Act, 1894:—

"Plastering or coarse stuff shall be composed of lime and sand in the proportion of 1 of lime to 3 of sand mixed with water and hair, but Portland cement, Keene's cement, Parian cement, Martin's cement, Selenitic cement, or other approved cement or plaster of Paris may also be used for plastering.

The lime to be used to be freshly burned lime.

The sand to be used must be clean sharp sand free from loam or earthy matter.

The hair to be used must be good and sound and free from grease or dirt: 1 lb. of hair to be used to every 3 cubic ft. of coarse stuff. Fibrous material to the satisfaction of the District Surveyor may be used instead of hair, and ground brick or furnace slag to the satisfaction of the District Surveyor may be used instead of sand.

The setting coat shall be composed of lime

or cement mixed with clean, washed sand, or of cement only.

Clean water only is to be used in mixing the material.

The Portland cement to be used must not weigh less than 90 lbs. to the imperial bushel.

Fibrous slab, or other slab, plastering of sufficient thickness, and securely fixed, may be used in ceilings, partitions, and walls to the satisfaction of the District Surveyor."

BOOKS RECEIVED.

THE MODERN HOMESTEAD, ITS ARRANGEMENT AND CONSTRUCTION. By Richard Henderson. With Introduction by James Macdonald, F.R.S.E. (London: The County Gentlemen's Association, Ltd., 16, Cockspur-street, S.W.)

ELECTRICAL INSTALLATIONS. By Rankin Kennedy, C.E. In four volumes. Vol. II. (London: The Caxton Publishing Co.)

THE DEANERY GUIDE TO WESTMINSTER ABBEY. (London: 18, Charing Cross-road.)

MODERN IRON FOUNDRY PRACTICE. By Geo. R. Bale, M.Inst.C.E. Part I. (London: The Technical Publishing Co., Ltd., Chancery-lane.)

REPORT ON CHANGES IN RATES OF WAGES AND HOURS OF LABOUR IN THE UNITED KINGDOM IN 1901. Board of Trade Labour Department. (London: Eyre & Spottiswoode; Edinburgh: Oliver & Boyd; Dublin: E. Ponsonby.)

GENERAL BUILDING NEWS.

RESTORATION OF LYDDINGTON CHURCH, RUTLANDSHIRE.—St. Andrew's Church was restored twelve years ago, but at that time want of funds prevented attention being given to the tower and spire. This work, however, has just been carried out. Hidden defects, such as the rotten lead gutter round the parapet, have been remedied; the shattered apex of the spire and its lights have been repaired; and a new copper cock, of ancient pattern and not gilded, has been supplied. The decayed parts of various features of the tower, from the parapets down to the mutilated base moulds, have been mended, and gaping joints have been filled up with cement. The greater visible improvement, however, has been made by taking away the old wooden flooring and stairs of the eighteenth century which served as ringing chamber, and also by removing the masonry which blocked the tower arch, thus restoring the interior to its ancient dignity. The fourteenth-century corbels and springers, which had originally been intended to carry the ribs of a vaulted roof, have been put to their proper use, and vaulting has been supplied after the style which predominated at that period. The old circular stairway now affords access to the new ringing-chamber over the vaulted roof. A new floor of stone has been put in the bottom of the tower, and repairs to the walls themselves have been made. At the western entrance new oak doors, put together with bronze studs, have been erected. The church has an ancient chancel screen, two brasses, a font with picturesque Jacobean cover, fragments of old mural painting, and an altar, 3 ft. from the east wall, approached by three steep steps, and entirely surrounded by heavy oak rails, dated 1635. In 1900 the chancel was restored by the Ecclesiastical Commissioners at a cost of about 550*l.*, under the direction of Mr. Ewan Christian, and the nave at a cost of about 1,000*l.*, defrayed by subscriptions from the parishioners. Mr. J. C. Traylen was the architect responsible for this latter part of the work, as well as the present work. Mr. Halliday, of Stamford, was the builder.

PRIMITIVE METHODIST CHURCH, LEEDS.—On the 16th inst. the foundation and memorial stones of a new and permanent building were laid at Leeds for the Primitive Methodists. The new site adjoins that on which the present building stands. The front of the chapel will be in line with Jubilee-terrace, and there will be a side entrance opposite Jubilee-street. The new erection is Late Gothic in style, the architects being Messrs. Howdill & Howdill, of Leeds. Red bricks and terra-cotta will be the materials used; the roof to be covered with Welsh slates. The woodwork inside will be pitch-pine, whilst the windows will be glazed with leaded lights of tinted cathedral glass. Low-pressure hot water is the system for heating. Accommodation is provided for 420 people on the ground floor and gallery; there will be an infants' school, large class-rooms, ministers' vestry, heating chamber, and lavatories. The cost is estimated at 2,000*l.*

NEW STEAM LAUNDRY, YARMOUTH WORKHOUSE.—A new steam laundry has just been opened in connexion with Yarmouth Workhouse. The work has been carried out from the plans of Mr. A. S. Hewitt, the Architect to the Board of Guardians. The laundry is situated on a plot of ground on the east side of the main workhouse buildings, and consists entirely of ground floor rooms, the general plan of the building being to secure the regular progression from one process to another of soiled linen and articles dealt with in the laundry until they reach the final stage of sorting and redistribution. The new building is approached from and is in direct communication with the long corridor that runs through the workhouse from east to west, and is laid out as follows:—The first room is used as a receiving-room; into this room all the linen is brought, and from thence taken into the foul washhouse, this room, as well as all the other machine rooms, being fitted up with washing machinery by Messrs. Tomlinson & Milan, Ltd., of Huddersfield. The general washhouse comes next in order, and is 36 ft. by 25 ft. This room is devoted to a couple of rotary washing machines. The drying-room is a specially-constructed chamber into which slide fourteen drying-horses, the hot air for the purpose being obtained by a revolving fan, which sends the cold air through a heated cylinder, and from thence into the drying chamber. The ironing-room is the largest of all the rooms, and is fitted with a Decoudun ironing-machine weighing about 4½ tons. Passing from the ironing-room is the delivery-room, into which all the linen sent into the laundry is finally taken. At the eastern-most end of the building are placed the boiler and engine-houses. The walls of the wash-houses are lined with Cockrill-Doulton glazed tiles, and all the rooms have open roofs with toplights and ventilators. The floors of the ironing and delivery rooms are laid with pitchpine blocks, all the other floors being of concrete. Mr. J. D. Harman was the principal contractor, Mr. Grimble being the sub-contractor for carpentering, and Mr. Gooda for the plumbing work. The entire building will be shortly lighted by electricity. The cost of the building is about 1,700*l.*, and the machinery 850*l.*

ADDITIONS, CONVALESCENT HOME, NEWHILLS, ABERDEEN.—On the 16th inst. the new wing for the treatment of consumptive patients just added to Newhills Convalescent Cottage Home was opened. Accommodation has been provided for twelve patients at a cost of about 1,100*l.* Mr. George Coutts was the architect.

HOLY TRINITY HOSPITAL, LEICESTER.—This hospital, which has recently been enlarged after plans and designs prepared by Messrs. R. J. & J. Goodacre, of Leicester, was founded for fifty almspeople in the Newark in pursuance of letters patent granted at Woodstock, on April 2, 1330, by Henry, third Earl of Lancaster, Leicester, and Derby. The Earl of Lancaster subsequently augmented the endowment, and converted the charity into the College of the New Work, with a dean, twelve secular canons, twelve vicars, and fifty poor men and fifty poor women on the foundation. The revenues at the Dissolution were calculated to exceed 800*l.* yearly. The Corporation bought the site, and re-established the college as a hospital, extending its benefits to sixty-five non-resident beneficiaries. The new buildings accommodate twenty-two men and seventeen women. They have been erected at an outlay of about 12,000*l.*, and a further sum of 1,300*l.* will be expended upon a restoration of the chapel. The present income of the charity is about 2,700*l.* per annum.

A MEMORIAL TO WYKEHAMISTS.—On October 9, when he will visit Winchester to receive the honorary freedom of the city, Lord Roberts will lay the foundation-stone of a new gateway at Winchester College, to be erected in memory of Wykehamists who have fallen in the course of the South African war. Mr. F. L. Pearson is the architect of the gateway, to be constructed of stone, with four turrets and a room over the archway. It will take the place of one of the existing entrances in Kingsgate-street, and should form a notable addition to the college buildings.

ST. JAMES'S CHURCH, MUSWELL HILL.—This church, whereof the former portion was consecrated about fifteen months ago, has now been completed, at a total cost of upwards of 13,000*l.*, and will provide sittings for 950 persons. The architect is Mr. J. S. Alder.

THE LONDON SCHOOL OF ECONOMICS, CLARE MARKET.—The London School of Economics and the British Library of Political Science have migrated from No. 10, Adelphi-terrace, to fresh quarters in Clare Market. The new buildings have been erected, at a total cost exceeding 16,000*l.*, by Mr. Howell J. Williams, contractor, from plans and designs by Mr. Maurice B. Adams, who was nominated, together with Mr. Harrison Townsend and Mr. S. B. Russell, in a limited competition, by trustees on behalf of the Technical Education Board, L.C.C., for whom Dr. William Garnett acted as referee. Mr. Passmore Edwards gave 10,000*l.* towards the cost of the fabric, and Messrs. N. M. Rothschild & Sons have since contributed 5,000*l.* to a building and endowment fund opened by the governors. In return the London County Council apportioned a site, whilst retaining the freehold, of 4,000 sq. ft., valued at 14,770*l.*, out of surplus lands of their High Holborn to the Strand Improvement scheme. The School of Economics forms a school of the University of London, as a new faculty of Economics and Political Science, including Commerce and Industry. The building, constructed of red brick with stone dressings, stands on a site between the northern ends of Clare and Houghton streets; to avoid litigation in respect of rights of light, the Corporate Property Committee of the London County Council decided after the work had been begun that it should be set back to an extent of 10 ft.

POLICE-COURT, WILMSLOW, CHESHIRE.—There have just been erected at Wilmslow a new sessions house and police buildings for the Wilmslow and Alderley Edge districts by the Cheshire County Council, the architect being Mr. Beswick, and the contractors Messrs. Meadows, of Southport. The new buildings, which have cost about 6,000*l.*, stand in the centre of the town. There is a courtroom and the usual rooms for the justices and witnesses. On the ground floor are the cells and offices for the district inspector and other officers. There is also a private residence for the chief officer, a parade ground, and accommodation for the ambulance.

WORK AT MANTON CHURCH, RUTLANDSHIRE.—This church has received a further touch of restoration in the renewal of the broken stonework and glazing of the three-light perpendicular window of the north transept by Messrs. Nichols Bros., builders, Oakham, under the direction of Mr. J. C. Traylen, architect, of Stamford. Other work of a similar nature is still required in the roof of the north aisle of the church.

FOREIGN.

FRANCE.—An exhibition of modern work in ivory is to be held shortly at Galliera Museum in Paris, in which a special place will be reserved for work from Dieppe, where ivory carving has long been an important local art.——The Government has commissioned M. Chedanne, the architect, to build a Hôtel at Vienna for the French Embassy. M. Bernier is to design the French Embassy building at Washington. The palace of the French Legation at Morocco is to be built from the designs of M. Bénard, and the similar building at Alexandria from the designs of M. Eustache.——M. Girault, the French architect, has been commissioned by the King of Belgium to enlarge the palace at Laeken. ——A monument has been inaugurated at Besançon to Victor Hugo, who was born in that town. M. Becquet is the sculptor.——M. Deguernel, architect, has been commissioned to carry out a University library at Caen.——The Curator of the Luxembourg Museum, in his routine of exhibitions, has arranged for a collected exhibition of the works of M. J. Lewis Brown, the painter, who died in 1890. It will commence in December and last for six months.——M. Espouy, the architect and former winner of the Prix de Rome, has been commissioned to erect, at the pretty little town of Cazeres-sur-Garonne, near Toulouse, a market building of artistic design, decorated with a frieze in polychromy, and enclosing two fountains with statues of Ceres and Pomona.——The death is announced, at Porte-Joie (Eure), of the landscape painter Ernest Baillet, remarkable for the bright and brilliant effects of his pictures. He had received medals in two of the annual salons, and an honourable mention in the exhibition of 1900.

GERMANY.—The German Emperor, on the 20th inst., unveiled a monument to the memory of the late Emperor Frederick, at Cronburg, near Homburg. The monument is the work of Professor Uphues, and shows the late Emperor in cuirassier uniform, with the mantle of the Order of the Black Eagle. He holds a field-marshal's bâton in his right hand, his left resting on his sword-hilt.——A monument symbolising the mythical knight Roland was unveiled by the German Emperor in Berlin on the 25th inst. The statue—the pedestal of which forms a fountain—is of large dimensions. The knight is represented as standing erect in full armour, holding a bare sword before him with both hands. The general design of the monument is Gothic, arranged in a scheme of red, black, and gold. Professor Lessing was the sculptor.

INDIA.—The North-Western Railway authorities are erecting a gas factory at the Karachi cantonment station to supply gas to their passenger trains.——A new surgical hospital for Calcutta is projected, as the medical authorities are convinced that the mixing of medical and surgical cases at the Medical College Hospital is not sound in principle or in results.—— The work of clearing the site for the municipal offices in Calcutta is proceeding rapidly, and insanitary areas hard by are to be acquired and destroyed or remodelled.——The foundation-stones of a new Roman Catholic church in Bombay were recently laid. Messrs. Gostling & Morris are the architects, and the building is estimated to cost 2¼ lakhs of rupees.——The Bengal Government contemplates the inauguration of a school of engineering at Dacca.

AUSTRALIA.—Extensive additions are to be made at the Prince Alfred Hospital, Sydney, at a cost of about 42,000*l.*——The work of the superstructure of the new central railway offices in Melbourne has now been commenced.——A gigantic bridge, which is estimated to cost 1,500,000*l.*, is to be constructed across Sydney harbour to connect that city with North Shore. The designs are for a bridge 3,000 ft. long, without approaches; the latter are to come under separate consideration.——The work of widening and deepening the Hopetoun channel at Geelong has almost been completed by the Public Works Department. The channel has been deepened to 23 ft. and widened to 150 ft.

MISCELLANEOUS.

The Sanitary Institute.—The nineteenth congress of the Sanitary Institute will open at Manchester on September 9. Nearly 350 sanitary authorities, including ten metropolitan boroughs and the London School Board, have appointed delegates to attend, and the principal meetings are to be held in the chemical, history, and physics theatres of Owens College, conferences being also arranged in the large hall and other portions of the Municipal School of Technology. Lord Egerton of Tatton will be the President of the conference, and the Lord Mayor of Manchester, Dr. James Hoy, is the chairman of the local committee which has been formed for the reception and entertainment of the delegates. Sir James Crichton Browne, Sir Alexander Binnie, Professor A. Sheridan Delépine, Mr. Alderman McDougall, J.P., Mr. Alderman W. Smith, Mr. James Niven, Mr. C. Jones, M.Inst.C.E., Mr. W. A. Taylor, F.R.C.V.S., Mr. W. Bland, Mrs. W. O. Meek, and Professor Sherrington are the presidents of sections and conferences. The delegates will be received at the Town Hall by the Lord Mayor, who will also open the Health Exhibition, which is to be held in connexion with the congress. Garden parties have been arranged at Tatton Park and Peel Park, and there is to be a conversazione in the Town Hall on the evening of the 11th. The popular lecture will be given by Sir William J. Collins, M.D., L.C.C., on "The Man *versus* the Germ."

Electric Light, Nantwich.—On the 20th inst., Colonel Langton Coke, C.E., held an inquiry at Nantwich with regard to an application by the Urban Council to borrow 12,505*l.* for electric lighting purposes and 1,275*l.* for the erection of a refuse destructor. Evidence in support of the application was given by the Clerk and Surveyor to the Urban Council, and by Mr. Peers, electrical engineer, of Manchester. The scheme provides for the erection of generating works and a refuse destructor on the Council's sewage farm close to the town, and for the same motive power to be used for both purposes. A memorial from manufacturers and tradesmen complaining that they were unable to compete with manufacturers and tradesmen in other towns owing to the excessive price charged for gas was read in favour of the scheme. The annual payments were estimated at 1,932*l.*, and the income at 2,440*l.*, this sum including 2,250*l.* which it was anticipated would be derived from the sale of electricity to the public at a charge of 6*d.* per unit.

Shadwell Fish Market.—The Corporation of London have completed their purchase of the market at Shadwell from the London Riverside Fish Market Co. at a price of 175,000*l.*, payable in Corporation Two and a-Half per Cent. stock at par. The rental of property at the market amounts at present to 4,458*l.* per annum. Some of the premises, however, are untenanted, and building sites are available for a development of the undertaking. The area covered by the purchase extends over 331,700 ft. superficial. The market was established by a company under an Act of Parliament obtained in 1882. In their Act of last year the Corporation took powers for a ratification, the sale to them, and for the widening, of the High-street, Shadwell, the improvement and extension of the market, and the erection of houses to be let at moderate rents to members of the labouring classes. Negotiations for the acquisition of the property were opened by the Corporation in April, 1899.

Electric Light, "Westinghouse Buildings," Strand.—Electric light works have been carried out at "Westinghouse Buildings" and its annexe, at the corner of Norfolk-street and the Strand. The building, comprising part of the Law Land Company's estate, consists of seven floors and basement, each floor being designed for about fourteen rooms. The wire service mains are brought into the building by the Charing Cross and Strand Electricity Supply Corporation, the supply being by continuous current at a pressure of 200 volts at the lamps. The main distribution board is of enamelled slate mounted in a massive teak frame, and provides for a separate circuit to each floor of the building, each circuit being controlled by D.P. fuses and a S.P. chopper type switch. From this main board a separate circuit is run to each of the local distribution boards for supplying the various floors through the D.P. bridge type fuses. All lamp circuits are run back direct to distribution board, no fuses being employed locally. The maximum number of incandescent lamps supplied from any sub-circuit is eight, and with few exceptions every lamp is furnished with a separate switch. The wiring is carried out in Simplex brazed tube, all the tubes being fixed in position as the building work proceeded, and the wires drawn in afterwards. "Westinghouse" building contains upwards of 700 lights, together with a system of electric bells for the tenants and service, gas, fire points, speaking tubes, &c. The work is under the supervision of Mr. Frederic H. Taylor, C.E., of Victoria-street, S.W., the consulting engineer to the Company, and is carried out by the electrical staff of the Law Land building department.

"The Formal Gardens of England and Scotland."—Her Majesty the Queen has accepted the dedication of Mr. H. Inigo Trigg's work on the Formal Gardens of England and Scotland, the concluding part of which will be shortly issued to the subscribers by Mr. B. T. Batsford.

The Trades Union Congress.—The programme of the Trades Union Congress, which will be opened in London on Monday, contains resolutions dealing with the Education Bill, compulsory arbitration in labour disputes, the housing question, labour representation, and old-age pensions. The Dockers' Union will propose that "in view of the colossal growth of trusts and combines of speculative capitalists and consequent concentration of capital and monopoly of industry, this Congress foresees the grave danger to the nation and the toilers of dislocation of trade, stoppage of work, and distress of wage earners. To avert such a calamity this Congress calls upon the Legislature to pass an Act creating a supreme Court of Arbitration, the Court to be presided over by a Lord Justice, and to be constituted by an equal number of workmen's and employers' representatives, who shall take evidence from the party aggrieved, or their representatives; legal experts to be in all cases debarred from acting as representatives; the power of the Court to be compulsory; conciliation courts for the various industrial centres to be formed, to act in conjunction with the supreme court, and to be termed district courts; in all cases workmen's representatives to be selected by trade unions as commissioners or members of the supreme court; for the effective dealing with disputes, commissioners to be constituted for the great staple trades, viz., mining, textile, transport, engineering, and agriculture, with a Crown judge over each; failing the courts settling disputes, cases to be submitted to the Supreme Court. Only unions registered under the Trade Union Act and firms covered by registration under an Act identical with the Trade Union Act to be eligible for consideration of Courts or Supreme Court of Arbitration. We therefore instruct the Parliamentary Committee to draft a Bill for the purposes aforesaid."

LEGAL.

DISPUTE AS TO THE ERECTION OF A WALL.

The case of Townsend *v.* Brickwood & Co., Ltd., was mentioned to Mr. Justice Swinfen Eady in the Vacation Court on Wednesday last, the 27th inst., on a motion by the plaintiff for an interim injunction to restrain the erection of a wall, &c., until the trial of the action or further order.

Learned counsel said that the parties had come to terms, and he asked that on the defendants undertaking not to build except in accordance with a certain plan, and the plaintiff giving the usual undertaking in damages, the motion might be ordered to stand till the trial, the costs of the motion being made costs in the action.

His lordship said that the proper course in the circumstances was for him to make no order on the motion, the costs being made costs in the action.

Order accordingly.

A BUILDING CASE SETTLED.

The case of the Mansions Proprietary, Ltd., *v.* Queen Anne's Chambers, Ltd., was mentioned to Mr. Justice Swinfen Eady in the Vacation Court on Wednesday last, the 27th inst., on a motion by the plaintiffs for an interim injunction to restrain the defendants from the alleged interference with a party wall, &c.

Mr. Bramwell Davis, K.C., for the plaintiffs, stated that the parties had been able to come to terms, which were, in effect, that the plaintiffs should have the benefit of an award already taken between the freeholders and the building owners. His application accordingly was that his Lordship would make an order by consent, the minutes to be signed by the learned junior counsel on both sides.

His Lordship: I will put it in this way. I will order a stay of all further proceedings in the action on the terms agreed, the minutes as to which will be signed by the junior counsel on both sides.

Order accordingly.

PROBABLE SETTLEMENT OF AN ANCIENT LIGHT CASE.

The case of Ellis *v.* Skillington was before Mr. Justice Swinfen Eady in the Vacation Court on Wednesday last, the 27th inst., on a motion by the plaintiff for an interim injunction to restrain the defendant until trial or further order from erecting buildings so as to obstruct the plaintiff's ancient lights.

Dr. Napier, for the plaintiff, said that the parties were negotiating as to a settlement, and asked that the motion might stand over for a week on the defendant giving an undertaking in the terms of the notice of motion.

His Lordship: How high is the defendant's new building—above or below the old building?

Dr. Napier: I am afraid I cannot tell your lordship that.

His Lordship: Have you filed all your evidence in support of your motion?

Dr. Napier replied in the negative. The plaintiff wished to file further evidence by surveyors and architects.

His Lordship: Have you come to an agreement yet?

Dr. Napier: No, not yet.

His Lordship: I do not object to the motion standing over till next week, but it must be available for determination then—either settle it or contest it. The evidence on behalf of the plaintiff must be complete by this day week.

Order accordingly.

RECENT PATENTS:

ABSTRACTS OF PATENTED INVENTIONS.

8,387.—Atmospherical Gas Burners: *R. T. Glover and J. G. Glover.*—For effecting more perfect combustion, and to prevent "lighting-back," in annular and other burners, the inventors devise an air-supply tube, together with concentrical mixing and burner tubes of which the several wire-gauze outlets are disposed in such a manner that they will cause the mixed air and gas to follow a circuitous course.

8,427.—A Crematory Furnace: *F. Millward.*—A current of air, through inlets above the furnace-doors, mixes with the hot gases that flow into the combustion-chamber, and short air-tubes, made in one piece with the movable front fire-bars, project into the fuel. The bars are cooled, and gas is thereby generated by the spraying of water from nozzles at the sides of the fire-bars. Side-flues convey the hot gases into the cremation chambers, whence down-take flues conduct them to the chimney. A lower chamber serves for the final process, and the ashes are removed with an asbestos brush through a chute into an urn. Waste heat from the furnace warms the chapel or mortuary chamber by means of air-heating flues or water-tanks arranged upon each side of the furnace.

8,428.—A Doubly-acting Spring Hinge for Doors: *J. Currie.*—A pivot on the casing engages with a recess in the housing in which it is fastened (for a ready fixing or removal of the door), with a recessed plate secured with screws. A spring in the housing regulates a tension-plate which is worked by rollers carried by pins upon one plate fitted with shanks and fastened horizontally with set-screws. The spring is adjusted with a screw and a nut to which it is affixed.

8,432.—Improvements in Section-ladders: *J. Daniel.*—A locking-bar which is pivoted upon the upper section of a telescopical ladder engages with the rungs of the lower section. A stud takes a slotted lug of the bar, which is forced over the rung by a spring, and is pressed aside by the rungs as one lifts the section by means of a cord and pulley. For lowering the section the bar can be forced clear from the rungs by means of a deflecting arm that is pivoted underneath it. A spring keeps the arm in play, but it can be turned downwards out of the way for the lifting of the upper section.

8,454.—An Appliance for Use with Gas-meters: *G. Dittmar.*—To enable measurement of a high-pressure gas with an ordinary meter, the meter is surrounded with a casing that holds gas having the same or about the same pressure as that of the gas which is to be measured; the inlet or the outlet, or either of them, may be connected directly to the meter; if both of them are so connected a high-pressure gas is admitted independently into the outer casing.

8,456.—A Grab for Dredging and Excavating Operations: *W. T. C. Beckett.*—Four segmental spear-head shaped blades pivoted on to the frame and linked to the lower half of the lower block constitute the bucket; both the lower and upper parts of the block slide upon a pair of tubular rods which project parallel-wise from the bucket-frame; the blades are locked in position for digging by an engagement between projections from the rods and catches on the lower block; the upper ends of the catch-levers are set over the surface of the lower half of the lower block in order that they may become unlocked and the blades be closed by the fall of the upper half on to the lower half of the lower block at the slackening of the working-chain, which is passed under the pulley of the lower half of that block; in the opened position hooks hang the upper block to the bell, but as the bucket and rods rise the lower half of the upper block will be lifted through the contact of stops upon the rods; the grab can then be lowered with its blades opened, as the weight of the upper half, exerted upon fingers, liberates the hooks; when the chain is hauled in, the bucket being closed, the upper end of the grab enters the bell, where it is retained by the hooks as a spring moves them outwards; the lower block falls with a further slackening until its upper part impinges against projections from bars; then the lower part falls a little more, and engagement of the catches with pins opens the bucket for its discharge.

8,480.—A Holder for Lamp-Globes, Chimneys, Shades, &c.: *C. W. Kemp.*—When the globe or chimney is put into its place, the pivoted arms of the holder will firstly move upwards and will then

drop beneath to engage with the rim. One raises by hand one of the arms for removal of the globe. The movement downwards of the arms is restricted with stops, and counterbalancing weights or springs supplement the action, through gravity, of the catches.

8,503.—VIBRATING JAW-CRUSHERS AND SCREENS FOR STONE CRUSHING AND SCREENING MACHINERY: *W. H. Baxter.*—One end of a lever which is pivoted at its middle is joined to the draw-back rod of the swinging jaw, and the other end is joined with a rod to the rocking-lever over its middle point. The former lever has notches that take V-shaped blocks upon the rods. For the feeding end of the lower screen, which receives material from the crusher, a conical mouthpiece and a flange for the cylindrical screen are fashioned on a disc, and the tailings are carried up to the upper screen. The flange constitutes a pulley for the elevator-belt, and the supporting arms of the disc are set in a plane distant to some extent from the face of the disc, the screen being fastened against the arm-ends.

8,518.—ELECTRICITY METERS: *U. A. Arioni.*—For measuring quantity, energy, and current. A spring, whereof the pull is varied automatically with a motor and is indicated with either a marker and recording-cylinder, or a pointer and scale, returns the pivoted coil of an electro-dynamometer to its zero position in opposition to the deflecting action of the current. For the dynamometer may be employed a pair of attracted coils, or a core and solenoid. The field magnet of the motor is connected between conductors through a divided resistance of which the ends are connected to two contacts, an insulated arm between the contacts is mounted upon a movable coil; the middle of the divided resistance and the arm as well are connected to the motor-brushes. Thus the motor will turn in either direction as one contact or the other is touched by the movable arm. A screw, driven by the motor, drives a worm-wheel upon which a pointer is mounted, the screw carries a non-rotatable nut that is secured to one end of a spring whereof the other end is fastened to an arm of the movable coil. A marker is mounted upon the nut.

8,519.—APPARATUS FOR OPENING AND CLOSING WINDOWS, DOORS, VENTILATORS, AND SO ON: *R. Adams.*—In one form a three-armed lever is pivoted to a fan-light and to a link that is pivoted on to the window-frame, the third arm of the lever is also pivoted to a link worked with a crank and worm-gearing; for working a set of fan-lights in one line, at one and the same time, a triple lever is mounted at the top and bottom windows, and the arms are joined to a rod which thus takes a parallel movement, the windows being linked to the rod.

8,556.—MANUFACTURE OF IMITATION MARBLE AND STONE: *G. Weber.*—The goods, intended for facing walls and floors, for columns, façades, and similar uses, are cast from "sorel" or magnesia cement, and so on, in metallic moulds having a lining or coating of hard lac or enamel that will resist the heat engendered in the course of setting. In one adaptation is employed a flat plate fitted with a skeleton of wood, cement, or glazed board, which is placed in the mass before it has become set.

8,619.—A REGULATOR VALVE FOR DOMESTIC WATER SUPPLY: *E. G. Watson.*—A hollow stem carries a valve that regulates communication between the inlet and outlet chambers, a flanged collar is screwed on to the stem beneath the valve; a piston at the upper end of the stem works in a retarding-chamber, which communicates with a cushioning-chamber by means of a time-screw, and with an outlet through the hollowed stem; a valve upon a rod normally closes the outlet, and the working lever engages with the lower end of the rod. Pressure upon the seat lifts the valve stem, and so opens the valve for escape of water from the space above, whereupon the supply will flow into a chamber below, and the main valve opening will be shut. As the seat again rises, the return flow of water upwards through a time-port slowly closes the main valve.

8,653.—OPENING-DEVICES FOR MOTOR STARTING-SWITCHES: *W. R. Ridings and Veritys, Limited.*—For no-load and over-load opening-devices, the inventors mount an arm that closes the main circuit and a rheostat arm upon a spindle, and provide each arm with a spring. The former arm is retained by a pin, or its own pivoted pawl, that engages with a catch upon the pivoted armature, a fixed core is placed in the shunt winding of the magnet, and beneath an adjustable core. The armature will not be held down, and the arm is thereby free, in the absence of current; but if an excess of current flows through the series winding of the magnet, the adjustable core is lifted and an arm raises the armature to liberate the arm on the spindle.

8,686.—A WATER BOILER OR GEYSER: *H. Jackson.*—For purposes of renewal or cleansing, and in order to furnish water ways having a large amount of surface, the inventor forms the interior of the geyser or boiler in three parts, jointed to one another. Above, and outside the boiler, is the supply cock. The water-inlet has a regulating float valve. On to the outer casing are joined the parts to which the air or escape tubes are screwed Confer also No. 11,927 of 1894.

8,688.—WATER SUPPLY (DOMESTIC): *E. O. Richter.*—To prevent the bursting of pipes through frost, and for thawing ice in pipes, they are fitted with a jacket in the form of a D-shaped chamber, having a funnel-shaped top. At the lowest point of the system the chamber is closed and has a draw-off cock. Ice in the service pipes may be thawed by the pouring of boiling water into the jacketing chamber at the top, then (after the cock to the main has been shut) the water may be drawn off from the pipes.

8,691.—BUILDERS' BLOCKS OF ARTIFICIAL STONE: *F. Boenke.*—The blocks and tiles are moulded from a composition which is made up of dried fir sawdust, impregnated with hot carbolineum and finely-sifted wood-ash, pulverised heavy spar, and magnesium chloride, with, it may be, soft water. Inside each block is placed a fabric of laced pieces of bamboo. The blocks are specified as being particularly suitable for use in tropical buildings, bath-houses, hospitals, and so on.

8,700.—FASTENINGS FOR DOORS OF COLD STORES: *T. Taylor and P. F. Kensett.*—The forked end of the sliding bolt engages with a nut set between collars and working upon a fixed screw which has flats that engage with a hole in a plate upon the door-jamb. The bolt is tightened or loosened by the turning of a handle which works the nut and causes either one of the collars to impinge against the end of the bolt. The withdrawal of the nut is prevented by a collar upon the screw. The appliance can be utilised as a locking-bolt by means of a hole in the bolt for a padlock.

8,767.—JOINTING FOR FLUSHING-PIPES: *H. L. Doulton.*—The joint is contrived for connecting a flushing-pipe to the horn of a closet-basin. A screw secures a band to the horn, on to which a flange is then affixed with screws, which at the same time press the packing together.

8,774.—FASTENINGS FOR WINDOWS: *E. G. Kendall.*—Middle pivots join the sashes to sliding stiles, and flat springs on the latter press against vertical wires or rods that are attached to the pulley stiles. The meeting surfaces of the pivot plates and the sash and sliding stiles are rounded, and T-shaped slots in the pivot-plates enable the pivots to take their proper places, wherein they are retained with keys put into recesses in the frame.

8,859.—SAFETY APPARATUS FOR LIFTS: *W. Gerling.*—Arms are pivoted on to the lower end of a spring bar to which the lifting rope is fastened. In the event of the rope breaking the spring presses the inner ends of the arms downwards, and so causes them to jamb with the guides. Moreover, there are provided arms, of which the inner ends have teeth underneath, and which are pivoted upon shafts mounted upon springs. Under normal conditions the latter arms are sustained horizontally with ropes from the spring bar, but they will be turned into a vertical direction when the rope breaks, and their teeth will then become engaged with the guide.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 14.—By HARDY & HARDY (at Uttoxeter).

Doveridge, Derby.—The Doveridge Estate (part of), 109 a., f. £7,180

By WINCH & SONS (at Maidstone).

High Halden, Kent.—Old Place Farm, 107 a. 0 r. 4 p., y.r. 62*l.* 10*s.* 1,130

Bethersden, Kent.—Potten Farm and Holmes Wood, 83 a. 3 r. 2 p., f., y.r. 72*l.* 4*s.* 10*d.* 1,150

Staplehurst, Kent.—Great Wadd Farm, 117 a. 3 r. 5 p., f. 1,700

Stone-cum-Ebony, Kent.—Stone Corner Farm, 130 a. 2 r. 30 p., f., y.r. 75*l.* 1,450

August 15.—By HUGH SWORDER (at Epping).

Theydon Bois, Essex.—Theydon Lodge, f., y.r. 70*l.* 1,220

Loughton-lane, freehold building land, 8 a. 2 r. 25 p. 940

High Laver, Essex.—Herbert's Cottage and 2 a., f., y.r. 8*l.* 200

North Weald, Essex.—Main-rd., three freehold cottages, y.r. 14*l.* 6*s.* 240

August 16.—By BENTLEY & SONS (at Doncaster).

Headby, Yorks.—Freehold farm, 141 a. 1 r. 28 p., y.r. 210*l.* 4,250

August 19.—By DEBENHAM, TEWSON, & CO.

Chelsea.—34, Bramerton-st., u.t. 38¼ yrs., g.r. 6*l.*, w.r. 54*l.* 12*s.* 400

Finchley.—Park-rd., The Chestnuts and ½ a., f., y.r. 70*l.* 1,400

1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, Park-rd., f., y.r. 80*l.* 13*s.* 2,590

High-rd., freehold building site, area 0 a. 0 r. 9 p. 1,475

By FLEURET, SONS, & ADAMS and VINTEN & SON (at Masons' Hall Tavern).

Margate, Kent.—The Royal York Hotel, f., p. .. 9,000

August 20.—By JAMES ELEY (at Boston).

Wrangle, Lincs.—High Toft Farm, 167 a. 1 r. 37 p., f. 5,700

By DICKINSON & RIGGALL (at Louth).

Theddlethorpe St. Helen's, Lincs.—Freehold farm and enclosures, 69 a. 3 r. 30 p. 2,600

August 21.—By CHESTERTON & SONS.

Notting Hill.—40 and 42, High-st. (S), u.t. 19 yrs., g.r. 10*l.*, y.r. 165*l.* £1,620

By NEWSON, EDWARDS, & SHEPHARD.

Dalston.—35 to 40, Regent's-row, u.t. 41 yrs., g.r. 15*l.*, w.r. 22*l.* 16*s.* 1,360

Barnsbury.—33, Half Moon-cres., u.t. 26 yrs., g.r. 5*l.* 5*s.*, y.r. 36*l.* 130

By SALTER, REX, & CO.

Kentish Town.—128, Prince of Wales-rd., f., y.r. 44*l.* 750

Hampstead.—7, Maitland Park-rd., u.t. 50 yrs., g.r. 8*l.*, y.r. 55*l.* 500

Camden Town.—31, Marquis-rd., u.t. 59 yrs., g.r. 3*l.*, y.r. 38*l.* 480

Mill Hill.—Flower-lane, two plots of land, f. 185

Birkbeck-rd., three plots of land, f. 100

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; w.r. for weekly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 13 0	per 1,000 alongside, in river	
Rough Stocks and Grizzles	1 10 0	,,	,, ,,
Facing Stocks	2 12 0	,,	,, ,,
Shippers	2 7 0	,,	,, ,,
Flettons	1 8 0	,,	at railway depôt.
Red Wire Cuts ..	1 12 0	,,	,, ,,
Best Fareham Red	3 12 0	,,	,, ,,
Best Red Pressed Ruabon Facing.	5 5 0	,,	,, ,,
Best Blue Pressed Staffordshire ..	4 6 6	,,	,, ,,
Do., Bullnose	4 11 0	,,	,, ,,
Best Stourbridge Fire Bricks	4 6 0	,,	,,
GLAZED BRICKS			
Best White and Ivory Glazed Stretchers.....	13 0 0	,,	,, ,,
Headers	12 0 0	,,	,, ,,
Quoins, Bullnose, and Flats	17 0 0	,,	,, ,,
Double Stretchers	19 0 0	,,	,, ,,
Double Headers..	16 0 0	,,	,, ,,
One Side and two Ends	19 0 0	,,	,, ,,
Two Sides and one End	20 0 0	,,	,, ,,
Splays, Chamfered, Squints.....	20 0 0	,,	,, ,,
Best Dipped Salt Glazed Stretchers and Headers ..	12 0 0	,,	,, ,,
Quoins, Bullnose, and Flats	14 0 0	,,	,,
Double Stretchers	15 0 0	,,	,, ,,
Double Headers..	14 0 0	,,	,, ,,
One Side and two Ends	15 0 0	,,	,, ,,
Two Sides and one End	15 0 0	,,	,, ,,
Splays, Chamfered, Squints.....	14 0 0	,,	,, ,,
Seconds Quality White and Dipped Salt Glazed....	2 0 0	,,	less than best.
Thames and Pit Sand	7 3	per yard, delivered.	
Thames Ballast	6 0	,,	,,
Best Portland Cement	31 0	per ton, delivered.	
Best Ground Blue Lias Lime..	25 0	,,	,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime..... 10*s.* 6*d.* per yard, delivered.

Stourbridge Fire-clay in sacks, 26*s.* 6*d.* per ton at rly. dpt.

STONE.

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depot
Bath ,, ...	1 7	,, ,,
Farleigh Down Bath ..	1 8	,, ,,
Beer in blocks	1 6	,, ,,
Grinshill ,, ...	1 10	,, ,,
Brown Portland in blocks	2 2	,, ,,
Darley Dale in blocks..	2 4	,, ,,
Red Corsehill ,,	2 5	,, ,,
Closeburn Red Freestone	2 3	,, ,,
Red Mansfield ,,	2 4	,, ,,
Hard York in blocks ..	2 10	,, ,,
,, ,, 6 in. sawn both sides and landings, to sizes (under 40 ft. sup.)	2 8	per ft. super. at rly. depôt.
,, ,, 6 in. Rubbed Ditto..	3 0	,, ,,
,, ,, 3 in. sawn both sides slabs (random sizes)	1 3	,, ,,
,, ,, 2 in. self-faced Ditto	0 9½	,, ,,
Hopton Wood (Hard Bed) in blocks	2	3 per ft. cube. deld. rly. depôt.
,, ,, ,, 6 in. sawn both sides landings	2	7 per ft. super. deld. rly. depôt.
,, ,, ,, 3 in. do.	1 9½	,, ,,

[*See also page 199.*

COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Municipal Offices	Bideford Town Council	30*l.*, 15*l.*, 10*l.*	Sep. 25
Free Library	Maidenhead Town Council	50*l.*, 20*l.*, 10*l.*	Oct. 1

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., Supplied by	Tenders to be delivered
Sewerage Works, Ynysybwl, Glam.	Mountain Ash U.D.C.	J. Williams, Surveyor, Town Hall, Mountain Ash	Sep. 2
Engine House, North Side Mills, Bradford	Messrs. D. Illingworth & Son	J. Ledingham, Architect, District Bank Chambers, Bradford	do.
Nurses' Home	Great Yarmouth Guardians	A. S. Hewitt, Architect, Bank Chambers, Yarmouth	do.
Alterations to Electricity Works, Bread-street	Brighton Town Council	T. J. Tilistone, Town Hall, Brighton	do.
Wall	Bangor (Ireland) U.D.C.	E. L. Woods, Civil Engineer, Town Hall, Bangor	do.
Road Works, Rosebery-avenue, Preston	Tynemouth Corporation	J. F. Smillie, Borough Surveyor, North Shields	do
Sewer Pipes	Cockermouth U.D.C.	J. Fearon, Council Offices, Cockermouth	do.
Street Works, Queen-street, Pontefract	.....	A. Oddy, Borough Surveyor, Municipal Offices, Pontefract	Sep. 2
Sewerage Works, Stapenhill, &c.	Burton-on-Trent Corporation	G. T. Lynan, Engineer, Town Hall, Burton	do.
Fourteen Cottages	Kinsale (Ireland) R.D.C.	R. Evans, Engineer, 53, South Mall, Cork	do.
Builder's Work at Hospital	Limerick Guardians	H. J. Guinane, Board Room, Workhouse, Limerick	do.
School Buildings	Hadleigh School Board	Kade & Johns, Architects, Cornhill Chambers, Ipswich	do.
Widening Road, Aberafon	Glam. County Council	T. M. Franklen, Westgate-street, Cardiff	do.
Asphalt Works	Hetton (Durham) U.D.C.	J. Harding, Surveyor, Council Offices, Houghton-le-Spring	do.
Sewers, London-road	Lowestoft Town Council	G. H. Hamby, Civil Engineer, Town Hall, Lowestoft	do.
Bridge Abutments, Ilkley	.....	J. B. Fraser, Architect, 8, Park-square, Leeds	do.
*Schools, Parkeston, Essex	Ramsey School Board	Start & Rowell, Architects, Colchester	do.
*Construction of Tramway Route	West Ham Council	Borough Engineer, Town Hall, West Ham, E.	Sep. 4
Steel Bridge, Pontwen Cynghordy	Llandovery R.D.C.	D. T. M. Jones, Council Offices, Llandovery	do.
Road Works, St. Mary's-avenue East	Southend Corporation	A. Fidler, Civil Engineer, Southend	do.
Roof at Gasworks, Regent-road	Salford Corporation	W. W. Woodward, Engineer, Bloom-street, Salford	do.
Sewer, Duke-street	Castleford (Yorks) U.D.C.	W. Green, Surveyor, Castleford	do.
Footpath Works	Willington U.D.C.	J. Cooke, Surveyor, 2, West End-terrace, Willington	Sep. 5
Piling Work	Southwold Corporation	Borough Surveyor, Town Hall, Southwold	do.
Kerbing, Setts, &c.	Soothill (Yorks) U.D.C.	J. Blackburn, Surveyor, Shaw Cross, near Dewsbury	do.
Chapel, &c., Holt-road	Cromer U.D.C.	A. F. Scott, Surveyor, West-street, Cromer	do.
*Seven Houses, near Slough	The Proprietor	Edgington & Summerbell, 7, Park-street, Windsor	do.
Boundary Wall, Armley	.....	City Engineer, Town Hall, Leeds	do.
Rebuilding Pavilion, Armagh	.....	H. C. Parkinson, Architect, Armagh	Sep. 6
Market Extensions	.....	T. C. Hope & Son, Architects, 23, Bank-street, Bradford	do.
School, Wyke	Bradford School Board	Adkin & Hill, Architects, Prudential Buildings, Bradford	do.
Rebuilding Pendarves Arms Hotel, Gwithian	Redruth Brewery Co.	H. W. Collins, Architect, Wairedton, Redruth	do.
Ornamental Iron Railing	Blackpool Corporation	J. S. Brodie, Borough Engineer, Town Hall, Blackpool	do.
Sewers, Parkgate	Rawmarsh (Yorks) U.D.C.	J. W. Bellamy, Council Offices, Rawmarsh	do.
Well, Shantallow	Londonderry R.D.C.	M. A. Robinson Civil Engineer, Londonderry	do.
Waterworks	Witney (Oxon) R.D.C.	G. Winship, Engineer, Borough Buildings, Abingdon	do.
Hospital	Pontypridd U.D.C.	J. C. Jones, Council Offices, Pontypridd	Sep. 7
Foundations of Hospital, Killingbeck	Leeds Corporation	E. T. Hall, Architect, 54, Bedford-square, W.C.	Sep. 8
Market Buildings	Llandovery Corporation	J. Thomas, Town Hall, Llandovery	do.
Well Sinking, Wingham	Margate Corporation	A. Latham, Civil Engineer, Municipal Buildings, Margate	do.
Bridge Improvements	Menai Bridge U.D.C.	J. J. Webster, Civil Engineer, 39, Victoria-street, S.W.	do.
Bridge	Llanelly Harbour Commissioners	J. V. Stewart, Engineer, Harbour Office, Llanelly	do.
Water Main (24,272 yards)	Margate Corporation	A. Latham, Civil Engineer, Municipal Buildings, Margate	do.
Cast Iron Pipes	Abercarn (Mon.) U.D.C.	G. Stevens, Engineer, Council Offices, Abercarn	do.
Cast Iron Pipes (415 tons)	Ashton-under-Lyne Waterwks. Cm.	G. H. Hill & Sons, Civil Engineers, 3, Victoria-street, S.W.	do.
Road Works, Ewbank-street	Stockton-on-Tees Corporation	M. H. Sykes, Engineer, Town Hall, Stockton	do.
Electric Power Station, Belfast	Great Northern Ry. Co. (Ireland)	T. Morrison, Engineer, Amiens-street Terminus, Dublin	do.
Rectory, St. Mary's, Truro	.....	R. H. Hale, Surveyor, 33, Old Queen-street, S.W.	do.
Schools, Beetham, Westmoreland	.....	J. F. Curwen, Architect, 20, Highgate, Kendal	do.
Club Premises, Briton Ferry	.....	H. A. Clarke, Architect, Briton Ferry	do.
Sewerage Works, Stratton	Highworth R.D.C.	Beesley & Co., Engineers, 11, Victoria-street, S.W.	Sep. 9
Turkish Baths	Dover Town Council	H. E. Stilgoe, Civil Engineer, Biggin-street, Dover	do.
Drainage Works, Potton	Biggleswade R.D.C.	Taylor & Co., Civil Engineers, 27, Great George-street, S.W.	do.
*Supply of Broken Granite	Edmonton U.D.C.	Council's Engineer, Town Hall, Edmonton	do.
*Supply of Stoneware Pipes	do.	do.	do.
*Supply of Portland Cement	do.	do.	do.
*Road Making and Paving Works	Bromley U.D.C.	Council's Surveyor, Bromley, Kent	do.
Water Supply, Bowes	Startforth R.D.C.	J. E. Parker, Civil Engineer, Post Office Chambers, Newcastle	Sep. 10
*Additns, Drainage, &c., to Old Park House & Goldie Leigh	Woolwich Union	Church, Quick, & Whincop, William-street, Woolwich	do.
*New Sorting Office, Walthamstow	Commissioners of H.M. Works, &c.	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	Sep. 11
*Making-up Streets	Southgate U.D.C.	Council's Surveyor, Palmer's Green, N.	Sep. 15
*Road Making Works	Hanwell U.D.C.	Council's Surveyor, Hanwell, W.	Sep. 15
School Buildings, Llwyncelyn, Porth	.....	J. Rees, Architect, Hillside Cottage, Pentre, Glam.	do.
Drainage Works, Brompton	Northallerton R.D.C.	W. Fowle, Council Offices, Northallerton	do.
*Supply of Broken Granite	Hanwell U.D.C.	Council's Offices, Hanwell, W.	do.
*Construction of Above-ground Convenience	Kensington Borough Council	Borough Engineer, Town Hall, Kensington	do.
*New Bath Rooms, &c., Renfrew-road Workhouse	Lambeth Guardians	S. R. J. Smith, Architect, 15, York-buildings, Adelphi, W.C.	Sep. 17
*New Municipal Buildings	Woolwich Borough Council	A. B. Thomas, Architect, 5, Queen Anne's-gate, S.W.	Sep. 18
*New Operating Room at Infirmary	Southwark Union	G. D. Stevenson, Architect, 13 and 14, King-street, E.C.	do.
Sewers	Burnley R.D.C.	S. Edmondson, Surveyor, 18, Nicholas-street, Burnley	Sep. 20
*Stores, Cart & Van Sheds, Lodge, & Public Urinals	Stepney Borough Council	Borough Engineer, 15, Great Alie-street, E.	Sep. 22
*Taking Down Fencing, Tottenham-lane	Hornsey U.D.C.	Council's Engineer, Southwood-lane, Highgate, N.	do.
*Board Room, Offices, Receiving Home for Children, &c.	Hammersmith Guardians	J. H. Richardson, Architect, 87, Finsbury-pavement, E.C.	Sep. 23
Sewer, Bridge-street (Contract No. 4)	West Hartlepool Corporation	J. W. Brown, Borough Engineer, West Hartlepool	Sep. 26
*New Cart Shed, Bothy, &c., Sydenham Wells Park	London County Council	Architect's Department, 18, Pall Mall East, S.W.	Oct. 7
House, Palmeira-avenue, Hove	.....	Clayton & Black, Architects, 152, North-street, Brighton	No date
Turbine House, &c., Newry, Ireland	.....	H. Thomson & Co., Newry	do.
Chimney at Gasworks	Wombwell (Yorks) U.D.C.	J. Robinson, Surveyor, Wombwell	do.
Six Houses, Griffithstown, Mon.	Mr. F. J. Bence	Swalewell & Creighton, Architects, Newport, Mon.	do.
*Foundations to Ground Lines and Concrete Flooring	Agricultural Organising Agcy, Ltd.	Surveyor, M2 Store, Millwall Dock, E.	do.
Gas Mains (3 miles)	Wombwell (Yorks) U.D.C.	J. Robinson, Town Hall, Wombwell	do.
Road Works, Dunning, N.B.	.....	Dove & Co., 29, York-place, Edinburgh	do.
Five Houses, Ashfield-road, Thornton, Yorks.	.....	W. Pickels, Architect, Thornton	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Foreman for Cliff Protection Works	Clacton U.D.C.	Not stated	Sep. 3
*Teacher of Building Construction	Norwood Technical Institute	Not stated	Sep. 8

These marked with an asterisk (*) are advertised in this Number. *Competitions, p.* — *Contracts, pp.* iv. vi. viii. & x. *Public Appointments,* xvii.

PRICES CURRENT (*Continued*).

SLATES.

in.	in.	£	s.	d.			
20 × 10	best blue Bangor	12	0	0	per 1000 of 1200 at rly. dep		
,,	best seconds ,,	11	10	0	,,	,,	
16 × 8	best ,,	6	17	6	,,	,,	
20 × 10	best blue Portmadoc	11	7	6	,,	,,	
16 × 8	best blue Portmadoc	6	5	0	,,	,,	
20 × 10	best Eureka unfading green	13	10	0	,,	,,	
16 × 8	,, ,,	7	10	0	,,	,,	
20 × 10	permanent green	10	10	0	,,	,,	
16 × 8	,, ,,	6	0	0	,,	,,	

TILES.

	£	s.	d.			
Best plain red roofing tiles	4	2	6	per 1,000, at rly. depôt.		
Hip and valley tiles		3	7	per doz.	,,	,,
Best Broseley tiles	4	8	6	per 1,000	,,	,,
Hip and valley tiles			4	0 per doz.	,,	,,
Best Ruabon Red, brown or brindled Do. (Edwards)	5	7	6	per 1,000	,,	,,
Do. ornamental Do.	6	0	0	,,	,,	,,
Hip tiles			4	0 per doz.	,,	,,
Valley tiles			3	,,	,,	,,
Best Red or Mottled Staffordshire Do. (Peakes)	3	0	9	per 1,000	,,	,,
Hip tiles			4	1 per doz.	,,	,,
Valley tiles			3	8 ,,	,,	,,

WOOD.

BUILDING WOOD.—YELLOW.

	At per standard. £	s.	d.	£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	14	10	0	16	0	0
Deals: best 3 by 9	13	10	0	15	0	0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	10	10	0	11	10	0
Battens: best 2½ by 6 and 3 by 6	0	10	0	less than 7 in. and 8 in.		
Deals: seconds	1	0	0	less than best		
Battens: seconds	0	10	0	,,	,,	,,
2 in. by 4 in. and 2 in. by 6 in.	8	10	0	9	10	0
1½ in. by 4½ in. and 2 in by 5 in.	8	0	0	9	0	0
Foreign Sawn Boards— 1 in. by 12 in. by 12 in.	0	10	0	more than battens.		
¾ in.	1	0	0	,,		
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4	10	0	5	0	0
Seconds	4	5	0	4	10	0
Small timber (8 in. to 10 in.)	3	12	6	3	15	0
Swedish balks	2	15	0	3	0	0
Pitch-pine timber (50 ft.)	3	0	0	3	10	0

JOINERS' WOOD.

	At per standard.					
White Sea: First yellow deals, 3 in. by 11 in.	22	0	0	23	0	0
3 in. by 9 in.	20	0	0	21	0	0
Battens, 2½ in. and 3 in. by 7 in.	16	10	0	18	0	0
Second yellow deals, 3 in. by 11 in.	18	0	0	20	0	0
,, ,, 3 in. by 9 in.	16	10	0	18	10	0
Battens, 2½ in. and 3 in. by 7 in.	13	0	0	14	0	0
Third yellow deals, 3 in. by 11 in. and 9 in.	14	0	0	15	10	0
Battens, 2½ in. and 3 in. by 7 in.	11	10	0	12	10	0
Petersburg: first yellow deals, 3 in. by 11 in.	20	0	0	21	0	0
Do. 3 in. by 9 in.	17	0	0	18	0	0
Battens	13	0	0	14	0	0
Second yellow deals, 3 in. by 11 in.	15	0	0	16	10	0
Do. 3 in. by 9 in.	13	10	0	14	10	0
Battens	11	0	0	12	0	0
Third yellow deals, 3 in. by 11 in.	12	10	0	13	10	0
Do. 3 in. by 9 in.	12	0	0	13	0	0
Battens	10	0	0	11	0	0
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14	0	0	15	0	0
,, ,, 3 in. by 9 in.	13	0	0	14	0	0
Battens	11	0	0	12	0	0
Second white deals 3 in. by 11 in.	13	0	0	14	0	0
,, ,, ,, 3 in. by 9 in.	12	0	0	13	0	0
,, ,, ,, battens	9	10	0	10	10	0
Pitch-pine: deals	16	0	0	18	0	0
Under 2 in. thick extra	0	10	1	0	0	0
Yellow Pine—First, regular sizes	32	0	0	33	10	0
Broads (12 in. and up)	2	0	0	more.		
Oddments	22	0	0	24	0	0
Seconds, regular sizes	24	10	0	26	10	0
Yellow Pine Oddments	20	0	0	22	0	0
Kauri Pine—Planks, per ft. cube	0	3	6	0	4	6
Dantzig and Stettin Oak Logs— Large, per ft. cube	0		6	0	3	0
Small ,, ,,	0	2	3	0	2	6
Wainscot Oak Logs, per ft. cube	0	5	0	0	5	6
Dry Wainscot Oak, per ft. sup. as inch	0	0	7½	0	0	8
¾ in. do. do.	0	0	7	-	-	-
Dry Mahogany— Honduras, Tabasco, per ft. sup. as inch	0	0	9	0	0	11
Selected, Figury, per ft. sup. as inch	0	1	6	0	2	0
Dry Walnut, American, per ft. sup. as inch	0	0	10	0	1	0
Teak, per load	16	0	0	20	0	0
American Whitewood Planks— Per ft. cube	0	3	0	0	3	6

Prepared Flooring—	Per square.					
1 in. by 7 in. yellow, planed and shot	0	13	0	0	16	6
1 in. by 7 in. yellow, planed and matched	0	13	6	0	17	6
1¼ in. by 7 in. yellow, planed and matched	0	15	0	1	0	0
1 in. by 7 in. white, planed and shot	0	11	0	0	12	6
1 in. by 7 in. white, planed and matched	0	11	6	0	13	6
1¼ in. by 7 in. white, planed and matched	0	13	6	0	15	6

6 in. at 6d. per square less than 7 in.

PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £	s.	d.	£	s.	d.
Rolled Steel Joists, ordinary sections	6	5	0	7	5	0
Compound Girders ,, ,,	8	2	6	9	5	0
Angles, Tees and Channels, ordinary sections	7	17	6	8	17	6
Flitch Plates	8	5	0	8	15	0
Cast Iron Columns and Stanchions, including ordinary patterns	7	2	6	8	5	0

METALS.

	Per ton, in London. £	s.	d.	£	s.	d.
IRON— Common Bars	7	15	0	8	5	0
Staffordshire Crown Bars, good merchant quality	8	5	0	8	15	0
Staffordshire "Marked Bars"	10	10	0	-	-	-
Mild Steel Bars	9	0	0	9	10	0
Hoop Iron, basis price	9	5	0	9	10	0
,, ,, galvanised	16	0	0	-	-	
(* And upwards, according to size and gauge.						
Sheet Iron, Black.— Ordinary sizes to 20 g.	10	0	0	-	-	-
,, ,, 10 to 24 g.	12	0	0	-	-	-
,, ,, 25 to 26 g.	12	10	0	-	-	-
Sheet Iron, Galvanised, flat, ordinary quality.— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12	15	0	-	-	-
,, ,, 22 g. and 24 g.	13	5	0	-	-	-
,, ,, 26 g.	14	5	0	-	-	-
Sheet Iron, Galvanised, flat, best quality:— Ordinary sizes to 20 g.	16	0	0	-	-	-
,, ,, 22 g. and 24 g.	16	10	0	-	-	-
,, ,, 26 g.	18	0	0	-	-	-
Galvanised Corrugated Sheets.— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12	15	0	-	-	-
,, ,, 22 g. and 24 g.	13	5	0	-	-	-
,, ,, 26 g.	14	5	0	-	-	-
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	12	0	0	-	-	-
,, ,, 22 g. and 24 g.	13	0	0	-	-	-
,, ,, 26 g.	14	5	0	-	-	-
Cut nails, 3 in. to 6 in. (Under 4 in. usual trade extras.)	9	5	0	9	15	0

LEAD, &c.

	Per ton in London. £	s.	d.	£	s.	d.
LEAD—Sheet, English, 3 lbs. & up.	13	15	0	-	-	-
Pipe in coils	14	5	0	-	-	-
Soil Pipe	16	15	0	-	-	-
ZINC—Sheet— Vieille Montagne	24	5	0	-	-	-
Silesian	24	0	0	-	-	-
COPPER— Strong Sheet per lb	[0	0	10	-	-	-
Thin ,,	0	0	11	-	-	-
Copper nails ,,	0	0	11	-	-	-
BRASS— Strong Sheet ,,	0	0	9	-	-	-
Thin ,,	0	0	10	-	-	-
TIN—English Ingots ,,	0	1	3½	-	-	-
SOLDER—Plumbers' ,,	0	0	6½	-	-	-
Tinmen's ,,	0	0	8½	-	-	-
Blowpipe ,,	0	0	9½	-	-	-

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	2¾d. ,, ,,
21 oz. thirds	3½d. ,, ,,
,, fourths	3¾d. ,, ,,
26 oz. thirds	4½d. ,, ,,
,, fourths	4¾d. ,, ,,
32 oz. thirds	5½d. ,, ,,
,, fourths	6½d. ,, ,,
Fluted sheet, 15 oz.	3d. ,, ,,
,, 21 ,,	4d. ,, ,,
½ Hartley's Rolled Plate	7½d. ,, ,,
⅝ ,, ,, ,,	9½d. ,, ,,
¾ ,, ,, ,,	9½d. ,, ,,

OILS, &c.

		£	s.	d.
Raw Linseed Oil in pipes or barrels	per gallon	0	2	9
,, ,, ,, in drums	,,	0	3	0
Boiled ,, ,, in pipes or barrels	,,	0	2	11
,, ,, ,, in drums	,,	0	3	2
Turpentine, in barrels	,,	0	2	10
,, in drums	,,	0	3	0
Genuine Ground English White Lead	per ton	21	0	0
Red Lead, Dry	,,	20	0	0
Best Linseed Oil Putty	per cwt.	0	8	6
Stockholm Tar	per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	6
Superfine Hard-drying Oak, for Seats of Churches	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal	0	18	0
Superfine Pale Copal Body	1	4	0
Extra Pale French Oil	1	1	0
Eggshell Flatting Varnish	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
French and Brush Polish	0	10	0

TO CORRESPONDENTS.

J. P. (Amounts below our limit.) J. F. W.—J. D. (Amount should have been stated.)

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ABINGDON.—For the construction of about 1,430 yards of stoneware pipe sewers for the Corporation. Mr. George Winship, C.E., Abingdon:—

Hinkins	£2,592 16 6	Craig	£1,777 12 9
Hayward	2,230 8 6	Wheeler	1,696 0 0
Roberts	2,095 0 0	Swaker	1,690 4 0
Mann	1,915 10 0	Randall, Abingdon*	1,598 7 10
Fenton	1,852 0 0		

ARMAGH.—For the erection of a house at the sewage disposal works, for the Urban District Council. Mr. J. Finlay Peddie, C.E., 36, Scottish Provident-buildings, Belfast:—

J. Kidd, Belfast £395

BISHOP'S STORTFORD.—For the supply of broken granite, &c., for the Urban District Council. Mr. R. S. Scott, Surveyor. Quantities by the Surveyor to the Council:—

	Mountsorrel Granite. Per Ton. s. d.	Mountsorrel Chippings. Per Ton. s. d.
Grimley & Son	13 8	10 11

BRIDGWATER.—For the construction of sewer and bacteria beds, Weston-zoyland, for the Rural District Council. Mr. W. A. Collins, engineer, 120, West-street, Bridgwater:—

E. H. Page	£215 7 8	R. Ashton, Bridgwater*	£154 0 0
Palmer & Sons	175 10 0		
C. Bryer, jun.	161 1 3		

CARLTON COLVILLE.—For gardener's cottage Carlton Colville, Suffolk, for the Rev. L. W. H. Andrews. Mr. Herbert J. Green, architect and Diocesan Surveyor, Norwich:—

G. Elsey	£338 0	W. J. Searle, contractor, Carlton Colville*	£418 19
A. G. Beckett	489 6		
C. R. Cole	460 8		

CHURSTON FERRERS (Devon).—For the erection of a clubhouse, Kalmpton, for Mr. T. B. Bolitho. Mr. W. F. Tollit, architect, Totnes. Quantities by Mr. V. C. Brown, Paignton:—

W. A. Goss	£933 0 0	Herbert Drew	£783 0 0
E. Pike	894 19 3	Hazelwood Bros., Brixham*	710 0 0
R. E. Narracott	795 9 0		

HASTINGS.—For the completion of western breakwater, &c., for the Harbour Commissioners. Sir Douglas Fox & partners, 28, Victoria-street, S.W., and Mr. T. W. Barber, 17 and 18, Tothill-street, Westminster, engineers:—

Messrs. Dowell & Co., 46, Queen Victoria-street, London £210,000

KIRRIEMUIR.—For shops in Kirriemuir for Messrs. Charles Tosh & Son. Mr. Lake Falconer, architect, Blairgowrie:—

Masonry.

Crabbe & Ballentine	£395 15 7	Gray & Sons	£345 0 0
W. McDonald	359 14 2	Watson & Son, Kirriemuir*	344 0 0

Joinery.

Fettis & Stephen	£379 18 6	Davidson & Herald	£305 0 0
Leslie & Hay	328 0 0	J. Low, Kirriemuir*	263 0 0
C. Ogilvy	308 18 6		

Plumbing.

Colin Wood & Co.	£90 2 9	G. P. Kidd	£70 0 0
A. Fyffe	89 5 4	Stewart & Son, Kirriemuir*	65 14 0
A. McGregor	89 3 6		
J. Adams	86 3 0		

Slating.

D. Mills	£90 0 0	T. Donaldson*	£16 18 7
Stewart & Son	17 15 0		

Plastering.

D. Mills	£38 11 0	G. Munro*	£33 9 6
J. Thoms	33 15 0		

[All steel beams will be supplied by the proprietors.]

[*See also next page.*

KIRRIEMUIR.—For double villa in Kirriemuir, for Messrs. Barrie & Guild. Mr. Lake Falconer, architect, Blairgowrie :—

Masonry.

William McDonald	£368 0 0
Watson & Son, Kirriemuir*	336 0 0

Joinery.

Davidson & Herald, Kirriemuir*	268 0 0

Plumbing.

Mrs. Adams	148 1 3
A. Fyffe	105 0 0
Stewart & Son, Kirriemuir*	103 0 0

Slating.

J. Mills	56 10 0
Stewart & Son, Kirriemuir*	52 8 6

Plastering.

G. Monro	36 0 0
D. Mills	34 6 0
John Thoms, Kirriemuir*	33 6 0

LANGLEY MOOR (Durham).—For the erection of St. Patrick's Schools, for the Rev. Jos. Thorman. Mr. H. T. Gradon, architect, 22, Market-place, Durham :—

Jas. Robson, Waterhouses* £1,690

LONDON.—For proposed works at 64, Eaton-square, S.W. Messrs. Walton & Lee, surveyors, 10, Mount-street, W. :—

	Structural Works.	Decorations.
Dunce & Co.	£1,137	£323
Thompson & Beveridge	1,125	308
Simpson & Son	1,100	300
Buckeridge	1,082	290
Stimpson & Co.	1,060	320
Mitchell & Son	980	249

MILLOM (Cumberland).—For the erection of banking premises for the Bank of Liverpool, Limited.—Mr. J. F. Curwen, architect, 26, Highgate, Kendal :—

Whole Estimates.

D. Mackereth	£3,980	W. Richardson	£3,170
R. G. W. Bradley	3,700	W. Tomlinson	2,983

Separate Estimates—Waller, Mason, and Bricklayer.

A. J. Blair	£2,095 0	R. Pennington, Kendal*‡	£1,705 10
W. Richardson	1,702 10	W. Tomlinson	1,600 0

‡ This includes granite base and steps supplied by the Shap Granite Co., Limited.

Slating.

A. J. Blair	£136 0 0	W. Tomlinson	£70 0 0
W. Richardson	73 16 0	Wm. J. Cross	65 4 0
Thos. Mandle	70 10 0	R. Pennington, Kendal*	64 10 0

Plastering.

Jas. Porrin	£186 5 3	W. Tomlinson	£160 0 0
W. Richardson	163 8 6	W. J. Cross, Morecambe*	149 12 0

Carpentry and Joinery.

Wm. Richardson	£214 12	Wm. Tomlinson, Millom*	£180 0
G. F. Martindale	735 0		

Plumbing, Painting, and Glazing.

Wm. Richardson, Millom £196 5 6

Plumbing.

Wm. Mandall	£234 3 0	David Burns	£230 0 0
Wm. Tomlinson	175 0 0	Mills & Son, Millom*	146 0 6
J. M. Clark	163 0 0		

Painting and Glazing.

Wm. Mandall	£102 2 7	Mills & Son, Millom*	£127 0 9
Wm. Tomlinson	100 0 0		

Fireproof Floor.

Mark Fawcett & Co., London £151

MACCLESFIELD.—For alterations to school buildings for the managers of the Industrial School. Mr. Jabez Wright, architect, Macclesfield. Quantities by the architect :—

B. Cooke, Macclesfield* £1,283

MIDDLETON.—For making-up Haworth-street for the Corporation. Mr. W. Welburn, Borough Surveyor, Town Hall, Middleton :—

Welch & Son	£263	P. Heard, Middleton Junction*	£223
Partington & Son	236		

MORLEY (Yorks).—For the erection of eight houses, Station-lane, Ardsley. Messrs. Newton & Asquith, architects, Ackroyd-street, Morley :—

Plastering.—Ed. Wilson, Morley* £54 0
Slating.—J. May, Morley* 54 0
Plumbing.—J. E. Richardson, Ardsley ... 23 10

SOUTHSEA.—For the erection of business premises, Elm-grove, &c., for Mr. R. Payne. Mr. G. E. Smith, architect, 145, Victoria-road North, Southsea. Quantities by architect :—

J. Durrant	£6,700 10	Davis	£6,245 0
W. Learmouth	6,427 0	Clark & Son	6,189 0
Corke	6,420 0	Crockerell	6,109 0
Sprigings & Co.	6,400 0	Coltherup	5,995 0
Dowdell	6,351 0	Salter, King's-road*	5,904 0
Harding	6,257 0		

[Steel construction by Messrs. Peirson & Co., of London.]

WANSTEAD (Essex).—For providing and setting Norwegian granite kerbing, Chigwell-road, for the Urban District Council. Mr. C. H. Bressey, Surveyor, Council Offices, Wanstead, N.E. :—

H. Williams	£249 19 8	Wm. Griffiths	£205 18 0
Meeston	237 0 0	Anderson	197 6 8
Wilson, Border, & Co.	214 5 0	Parsons & Parsons	185 3 0
D. J. Jackson	210 0 0	W. Manders, Leyton*	181 13 0
French	206 9 0		

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